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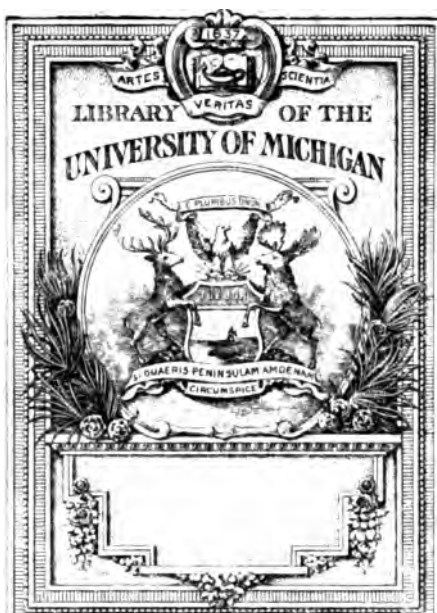
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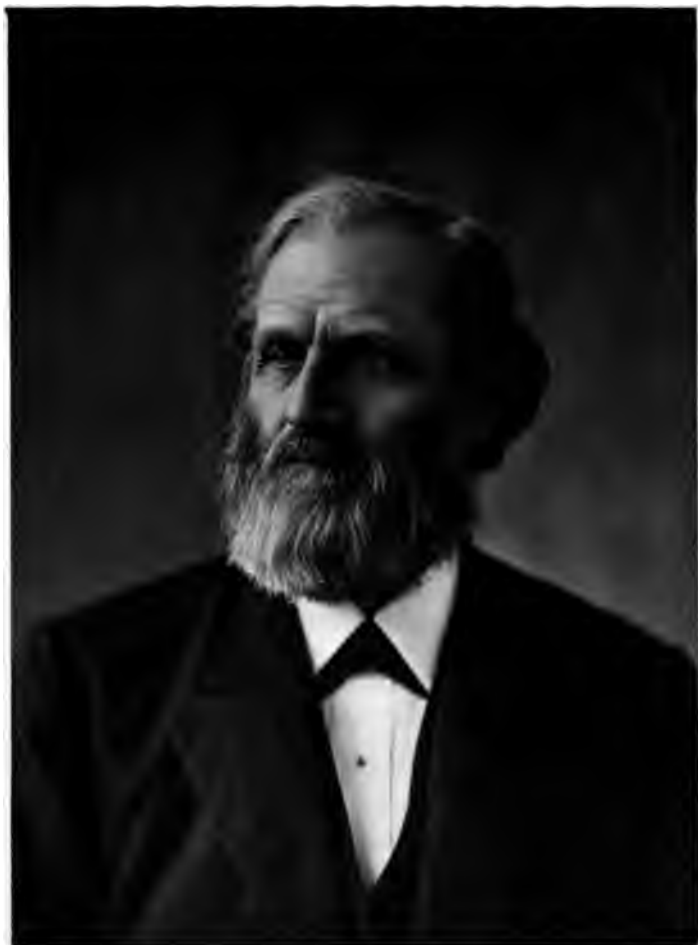
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PROCEEDINGS  
OF THE  
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VOLUME V.  
—  
PAPERS.

ON CERTAIN RECENT, QUATERNARY, AND NEW  
FRESH-WATER MOLLUSCA.

BY R. ELLSWORTH CALL.

*Read before the Academy, February 26th, 1886.*

THE area which has contributed most of these forms is little known conchologically. All the knowledge gathered concerning its molluscan fauna is fragmentary, and, for the most part, scattered through many publications, rendering a collation of their information an imperative need. Such a collation has been for some time in progress, and the present writer hopes soon to present a summary of the results.

Of the six species herein described, four have hitherto been characterized by me, two of which were, in deference to authority, given only varietal rank. It is now proposed to recognize the varietal names as of specific value, and to republish the original descriptions as applicable to the specific name. This disposition is made in the light of continued and careful study of these forms in conjunction with well-preserved specimens of the species of which they were formerly regarded as varieties.

## RISSOIDÆ.

*Genus* AMNICOLA Gould & Haldeman (1841).**Amnicola dalli**, sp. nov.

(Plate I., Figs. 4-6.)

*Amnicola dalli*, Call.—Bull. U. S. Geol. Sur., No. 11, p. 45, Plate VI., Figs. 4-6 (1884).

Shell narrowly umbilicate, obtusely conical, shining, slightly striated, brown or greenish horn color; whorls four, convex, gradually increasing in size; suture regularly impressed, somewhat deep; aperture rounded before, somewhat angular behind, bluish white within; lip simple, sharp, margins joined by a thick callus, columella rather reflexed.

Length, 3.50<sup>mm</sup>; breadth, 2.30<sup>mm</sup>.

*Habitat and Station*.—Mountain streams tributary to Pyramid Lake, North-west Nevada.

For the diagnosis of the lingual dentition I am indebted to Mr. Charles E. Beecher, who has prepared the following description and illustrations:

"Jaw thin, membranaceous.

"Odontophore 1.10<sup>mm</sup> long, .13<sup>mm</sup> wide. In a full-grown example the odontophore has 94 transverse rows of teeth, with the formula 3—1—3.

"Rhachidian tooth short and broad, with the inferior lateral angles produced. Cusp with seven denticles, of which the central one is the largest. The anterior lateral faces are each furnished with a short, strong, conical denticle, and the adjacent lateral margin of the tooth is thickened and slightly produced. Formula for rhachidian tooth:

$$\frac{3+1+3}{1+1}$$

"Body of intermediate tooth quadrate; infero-interior angle somewhat produced: furnished with a large bullation, into which the infero-interior angle of the succeeding tooth appears to fit as if for articulation. Peduncle long and straight. Cusp with seven strong angular denticles, arranged according to the formula 2+1+4.

"Body of the first lateral tooth elongate-triangular, oblique to the direction of the broad peduncle. Cusp inflected, and carrying twenty-three slender denticles.

"Outer lateral tooth hamate, with no marked distinction between the body and peduncle. Free extremity incurved and bearing thirty-four minute denticles. The denticle formula is, therefore,

$$34-23-7-\frac{3+1+3}{1+1}-7-23-34.$$

"The apparent articulation of the intermediate teeth, as described above, was observed in a fragment of an odontophore which presented a lateral aspect under the microscope. It is not known that this feature has ever been noted in any other species, although it very probably occurs in many which have foraminated or bullate teeth. This disposition of the teeth would allow great flexion of the odontophore without their displacement."

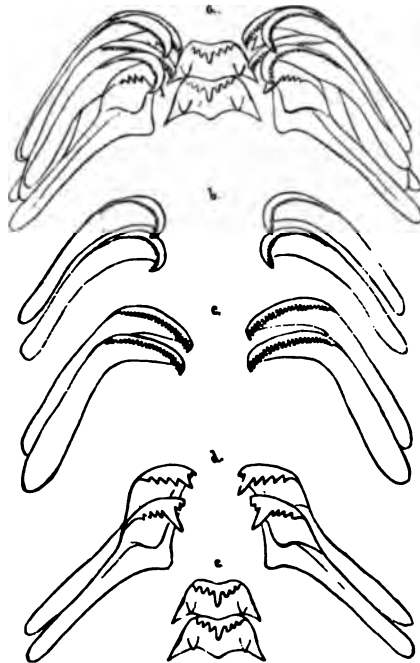


FIG. 1.—Lingual dentition of *Amnicola dulli*, Call  $\times 400$ .—Beecher.

a.—Two of the transverse rows of the odontophore, showing the normal position of the teeth. The teeth are considered as opaque.

Analysis: b.—Outer laterals. c.—First laterals. d.—Intermediate teeth. e.—Rachidian teeth.

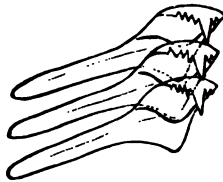


FIG. 2.—Intermediate teeth ( $\times 400$ ), showing mode of articulation.—Beecher.

This quite distinct form was collected in considerable numbers at Symon's Stage Station, near the foot of Pyramid Lake, Nevada. Its nearest congener is *A. porata* Say, from which it differs in elevation, sculpturing, and dentition. Since this last character is the one of chief importance, the description of the dentition is here given. Comparing the denticle formulæ of the two forms, thus:

*A. porata.*

$$30-18-5-\frac{3+1+3}{4+4}-5-18-30,*$$

*A. dalli.*

$$34-23-7-\frac{3+1+3}{1+1}-7-23-34,$$

the dissimilarity is strongly marked. Specimens may be seen in numerous private collections, and in the cabinets of the Smithsonian Institution, the New York State Museum of Natural History, and the Davenport Academy of Natural Sciences.

VALVATIDÆ.

*Genus VALVATA* Müller (1774).

***Valvata utahensis*, sp. nov.**

(Plate I., Figs. 1-3.)

*Valvata sincera*, var. *utahensis*, Call.—Bull. U. S. Geol. Sur., No. 11, p. 44, Plate VI., Figs. 1-3 (1884).

Shell operculate, narrowly umbilicate, conical, with minute transverse striæ, shining, somewhat pellucid, yellowish horn color at apex, white below; spire obtusely elevated, flattened at tip; suture well impressed; whorls four, convex, regularly increasing, the uppermost ones with a single well-marked carina, which becomes obsolete on the last whorl; last whorl equals one-half the whole length of the shell; aperture circular, slightly angled posteriorly; peristome simple, continuous, joined to the next whorl above by a very slight calcareous deposit; within white.

Operculum light horn color, corneus, spirally multivolute, slightly produced posteriorly to conform to the shape of the aperture. Dentition unpublished.

Length, 4.80<sup>mm</sup>; breadth, 3.20<sup>mm</sup>.

*Habitat*.—Lake Utah, Utah.

\* After Stimpson, Smithsonian Misc. Coll., No. 201, p. 14, Fig. 6; also *ibid.*, No. 144, p. 86, Fig. 158.

This form was dredged by the writer, in August, 1883, in great numbers in Utah Lake, near Lehi, not far from the head of the River Jordan. It is intermediate between *Valvata sincera* Say and *V. virens* Tryon. From the first it differs in the unicarinate upper whorls, in being more elevated, in possessing a very much smaller umbilicus, and in its greater size. From the second it differs in color, size, carination, and form of aperture. It resembles, in some respects, *V. unicarinata* De Kay (= *V. tricarinata* Say), but differs in size, ornamentation, and form of aperture. Specimens may be seen in the Smithsonian Institution, in the New York State Museum of Natural History, in the Davenport Academy of Natural Sciences, and in the private collections of Beecher, Stearns, Dall, Aldrich, and the writer.

#### LIMNÆIDÆ.

*Genus* RADIX Montfort (1810).

#### **Radix utahensis**, sp. nov.

(Plate I., Figs. 7-9.)

*Radix ampla*, var. *utahensis*, Call.—Bull. U. S. Geol. Sur., No. 11, p. 47, Plate VI., Figs. 7-9 (1884).

Shell globose, somewhat umbilicated, irregularly costate, light horn color, nearly pellucid; spire rather small, conical; whorls four to four and one-half, convex, somewhat flattened above, giving rather a shouldered appearance to the whorls, rapidly increasing in size, the last whorl being inflated, with numerous rather marked transverse costæ, minutely wrinkled; suture somewhat deep, regularly impressed; aperture elongately ovate, effuse, approaching patulous, pearly white within; outer lip simple, the margin connected by a slight calcareous deposit; columella somewhat twisted, but straight in front. Dentition unpublished. Length of largest specimen, 16.82<sup>mm</sup>; breadth, 8.88<sup>mm</sup>. The average of nine specimens gave a length of 13.40<sup>mm</sup>, breadth 7.10<sup>mm</sup>, with about the same ratio for corresponding measurements of aperture.

Length, 13.40<sup>mm</sup>; breadth, 7.10<sup>mm</sup>.

Length of aperture, 9.00<sup>mm</sup>; breadth of aperture, 5.90<sup>mm</sup>.

*Habitat and Station*.—Lake Utah, Lehi, Utah.

This is a rare form in Utah Lake, its only locality so far as known. Its nearest affinity is *Radix ampla* Mighels. In the preceding reference its relation to *Polyrhytis kingii* Meek has been noted. It was associated with abundant specimens of the *Valvata* herein described, and with *Fluminicola fusca* Haldeman and *Sphærium dentatum* Haldeman. Specimens may be seen as above.

*Genus* LIMNOPHYSA Fitzinger (1833).***Limnophysa bonnevillensis*, sp. nov.**

(Plate I., Figs. 10-13.)

*Limnophysa bonnevillensis*, Call.—Bull. U. S. Geol. Sur., No. 11, p. 48, Plate VI., Figs. 10-13 (1884).

Shell umbilicated, elongate, ventricose or bullate, somewhat solid, faintly striate and very minutely reticulated below the suture, the last whorl bearing faint longitudinal ridges or costæ; spire elevated, acute; suture deeply impressed; whorls 4 to  $4\frac{1}{2}$ , very much rounded, sometimes tending to geniculation above, the last whorl equal to three-fourths the whole length of the shell, rapidly increasing in size, much swollen, somewhat expanded at base; columella somewhat plicate, slightly callous, regularly arcuate; columella and peristome continuous; peristome simple, margins joined by a heavy callus, which is continuous and so reflexed as to partially close the umbilicus; aperture broadly ovate, often patulous, equal to one-half the entire length of the shell, oblique, angled slightly behind.

Fossil, Quaternary. Bonneville Lake beds, Kelton, Utah.

The four largest specimens of the many in the collections give the following dimensions:

SPECIMEN.	LENGTH.	BREADTH.
	mm.	mm.
1.....	15.00	7.80
2.....	11.00	5.80
3.....	9.40	5.20
4.....	18.50	6.00

## STREPOMATIDÆ.

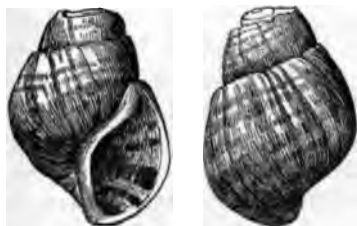
*Genus* GONIOBASIS Lea (1862).***Goniobasis stearnsiana*, sp. nov.**

FIG. 3.  
GON. STEARNSIANA.  $\times \frac{3}{2}$

Shell globose, not very elongate, excavated in umbilical region, but not umbilicated, usually coarsely and obliquely costate on upper whorls; spire conical, not much elevated; whorls  $5\frac{1}{2}$ – $6\frac{1}{2}$ , scarcely convex, appressed at the suture, body-whorl very large, more than equalling one-half the entire length, often angulate at periph-

ery, above which it is flattened, many-banded and smooth, or bandless and coarsely multistriate, the striae cord-like and variable in number, coarsely and obliquely wrinkled by the well-marked lines of growth; suture well but irregularly impressed; aperture oblique, trapezoidal, twice as long as broad, effuse, white or creamy-white within, often banded with broad purple bands, slightly retuse at columellar region; peristome simple, sigmoid, a little thickened, somewhat reflexed at base of columella; columella thickened, always white, twisted; parietal wall usually with a thick deposit of callus, which is sensibly thickened near the posterior angle of aperture.

Operculum black, otherwise as usual in the genus.

*Habitat and Station.*—This shell occurred only in a limited area in Dyke's Creek, a clear and cold mountain stream tributary to the Etowah River, Floyd County, Georgia. Associated with it were numerous specimens of *Margaritana georgiana* Lea, two species of undetermined *Unio*, *Goniobasis vittata* Anthony, and *Goniobasis bella* Conrad. It has the habit of *Anculosa*, and is to be sought only in the most swiftly flowing and deepest portions of the stream, on rocks. It is not abundant, the most painstaking examination revealing some two hundred individuals.

The characters given are those which appear to be most constant, though some of these are variable. The variations, as usual in this family, range through wide limits. Thus, occasional specimens of the smooth and banded type depart so far from the figure that the whorls are loosely coiled and very much rounded; this does not appear to be of varietal value, but is pathologic. The color, again, ranges from light yellow to dark olive, and the peripheral angle becomes almost a carina. The average dimensions of seventeen individuals are, for length, 21.14<sup>mm</sup>; for breadth, 12.02<sup>mm</sup>. The largest specimen has a length of 26.08<sup>mm</sup> and a diameter of 14.00<sup>mm</sup>.

Specimens may be seen in the United States National Museum, Cornell University, New York State Museum of Natural History, Amherst College, Davenport Academy of Natural Sciences, and in the private collections of C. E. Beecher, T. H. Aldrich, and the writer. The species is named in honor of Dr. R. E. C. Stearns, so well known for his researches on the Pacific Coast mollusca.

## CORBICULIDÆ.

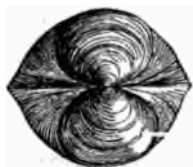
*Genus SPHÆRIUM Scopoli (1777).***Sphærium uintaense**, sp. nov.

FIG. 4.  
SPHÆRIUM UINTAENSE.  
× 5

Shell thin, small, globose, ventricose, slightly inequilateral, posterior and anterior margins well rounded, very slightly produced posteriorly; umbones large, subcalyculate, full, rounded, dark, retaining embryonic shell, approximate; basal margin rounded, thus giving a circular outline to shell; epidermis shining, dark straw or olive colored, substrate, light yellowish on basal margin; cardinal teeth microscopic, slightly in advance of the middle region of the umbones, not widely separating; lateral teeth small, short, somewhat upcurved.

Viewed in profile from in front, the point of junction of lower portion of valves with the embryonic shell appears as a well-marked obtuse angle.

Length, 4.76<sup>mm</sup>; diameter, 4.02<sup>mm</sup>; number of specimens, eight.

*Habitat and Station.*—A lake in the Uinta Mountains, Utah, at an elevation of 10,500 feet. The specimens were communicated by Prof. Orson Howard, of Salt Lake City, and were collected by him in August, 1885.

This species is remarkable for its small size, all the specimens seen being mature, and one with fry, and for the great elevation at which it occurred. This is by far the greatest hypsometric range recorded for any lamellibranch. The lake is snow-fed, and therefore its normal temperature must be far below that of waters in which the *Corbiculidæ* usually occur. Its extreme fragility and small size, it is believed, must be coördinated with these features of its environment. Specimens are in the collection of Prof. O. Howard and of the writer.

It may not be altogether improper, in this connection, to advert to the lax usage of naturalists in connection with the terms *habitat* and *station*. They are used as though strictly synonymic, while possessed of a definite and precise meaning. It is proposed, therefore, that the term *habitat* be used in the sense of geographic distribution, while *station* should be used always and alone to indicate the immediate physical environment of the form considered. Such is the sense herein contemplated.

**ON PYRGULOPSIS, A NEW GENUS OF RISSOID  
MOLLUSK, WITH DESCRIPTIONS OF  
TWO NEW FORMS.**

BY R. ELLSWORTH CALL AND HARRY A. PILSBRY.

*Read before the Academy, February 20th, 1886.*

IN September, 1883, Mr. R. E. C. Stearns described a rissoid mollusk from Pyramid Lake, Nevada, under the name of *Pyrgula nevadensis*. His description was based, in part, upon material furnished by one of the present writers, which was, at that time, inconsiderable in amount. In the following year the form was collected in almost incredible numbers in the original locality, and studied by Messrs. Call and Beecher in as complete a manner as rather unfavorable circumstances would admit. At that time the generic reference of the species appeared to be unquestionable, and, in the absence of specimens of European *Pyrgula* for comparison, was agreed upon as probably correct. Since this later study of the Nevada form, in which the dentition was illustrated and found to be rissoid, additional data have accumulated, which appear to render impossible the original generic reference. These data consist, in the main, of a careful study of the original bibliographic matter concerning the institution of *Pyrgula* as a genus, of the discovery of at least two additional forms which seem to be congeneric with *Pyrgula nevadensis*, neither of which agree with typical *Pyrgula*, either in station or understood hypsometric range, and of certain conchologic features that appear in the following diagnosis. In the further absence of any generic group which will include these shells, it has seemed proper to institute for their reception a genus that would do no violence to their conchologic affinities or to their geographic distribution. We therefore propose the name of *Pyrgulopsis* for these forms, and define the genus as follows:

PYRGULOPSIS, *gen. nov.*

(Etymology: *Pyrgula*, and *opsis* aspect of.)

Type, *Pyrgulopsis nevadensis* Stearns.

*Pyrgula nevadensis* Stearns.— Proc. Phila. Acad. Nat. Sci., 1883.

Generic characters: Shell minute, conically turreted, somewhat elongated, imperforate, unicarinate; apex acute; aperture ovate; peritreme continuous.

Operculum ovate, thin, corneous, spiral, with polar point well forward and approximating the columella.

Jaw thin, membranaceous.

Odontophore with teeth arranged in transverse rows, according to the formula  $3 + 1 + 3$ . Formula for denticles of rhachidian:

$$\frac{4 + 1 + 4}{1 + 1}.$$

Distribution: Western and South-western United States, in fresh or brackish water.

So far as known to us, the typical European *Pyrgule* are bicarinate or multicarinate. The type of the genus is the species described by Michelin\* as *Melania helvetica*. The founders of the genus, Christoforo and Jan, described the same form as *Pyrgula annulata*, from a locality in Switzerland. Figures 11 and 12 of Plate II. are drawn from Switzerland specimens of this form.

As above defined, this genus will include the form described by Mr. John Wolf as *Pyrgula scalariformis*.† Although the first described species, it was not considered advisable to constitute this form the type of the genus. Being a post-pliocene fossil, it was impossible to indicate those characters in the animal itself which are desirable in framing an intelligible diagnosis. These have, so far as the operculum and dentition go, been studied in the Nevada form only. The remaining species to be included are, besides the type, *P. mississippiensis*, sp. nov., and *P. spinosus*, sp. nov.

#### DESCRIPTIONS OF THE SPECIES OF PYRGULOPSIS.

##### **Pyrgulopsis nevadensis Stearns.**

(Plate II., Figs. 1-10.)

*Pyrgula nevadensis* Stearns. — Proc. Phila. Acad. Nat. Sci., p. 173, figure (1883).  
— Call and Beecher, Am. Nat., Sept. 1884, Vol. XVIII., pp. 851-855; from this paper the present account of the dentition is copied. — Call, Bull. U. S. Geol. Survey, No. 11, 1884.

Shell small, somewhat elongated, variable, turreted, imperforate; whorls  $4\frac{1}{2}$  -  $5\frac{1}{2}$ , strongly unicarinate on periphery, otherwise smooth; epidermis shining, light straw color or whitish, white at suture; suture deeply and regularly impressed, made conspicuous by the approximating carina; aperture very oblique, roundly ovate, with an angle on outer edge corresponding to the excavated carina, posteriorly sharply

\*Magazin de Zoologie, p. 37, Plate xxxvii. (1831.)

†Vide American Journal of Conchology, Vol. V., 1869, p. 198, Plate xvii., Fig. 3.

angled, well rounded before; peritreme continuous, almost rimate, closely appressed to parietal wall.

Operculum light corneous, spiral, closely fitting the aperture.

The following account and illustration of the dentition is by Mr. Charles E. Beecher, who has devoted much attention to the dentition of this group:

"Jaw thin, membranaceous.

"Odontophore .62<sup>mm</sup> in length, and .15<sup>mm</sup> in width. There are usually fifty-five transverse rows of teeth, arranged according to the formula 3 — 1 — 3, which is common to the family *Rissoidea*.

"Rhachis distinct, occupying one-fourth the width of the ribbon. Rhachidian tooth (Fig. 1) short and broad, with the infero-lateral angles produced and slightly arcuate. On each side of the anterior face is a strong, short, conical process or basal tooth projecting outward and somewhat downward. Basal margin trilobate; central lobe truncate. Cusp curved forward, and extended into a strong denticle with four smaller ones on each side. The formula of the denticles for this tooth would, therefore, be:

$$\frac{4+1+4}{1+1}$$

"Body of intermediate tooth\* subrhomboidal, with the infero-interior angle slightly produced and with an angulation in the margin above. From this point there is a thickening or ridge extending toward the fixed end. Peduncle longer than the body of the tooth. Upper margin abruptly curved forward and marked by seven denticles, of which the third inner one is usually the largest; the formula for this tooth may be written 2+1+4.

"Inner lateral tooth (Fig. 3) spoon-shaped, with the infero-interior margin angular. Upper anterior margin marked with a fringe of about twenty-four denticles, decreasing in length from the interior extremity. Peduncle straight, wider than the body.

"Outer lateral tooth (Fig. 4) falciform, straight along the peduncle. Anterior margin and extremity denticulated with thirty minute denticles, usually decreasing in length toward the distal extremity, but subject to some variation. The denticulate margin extends more than one-third the length of the tooth. Peduncles slender and nearly straight.

"The formula for the denticles is:

$$30-24-7-\frac{4+1+4}{1+1}-7-24-30.$$

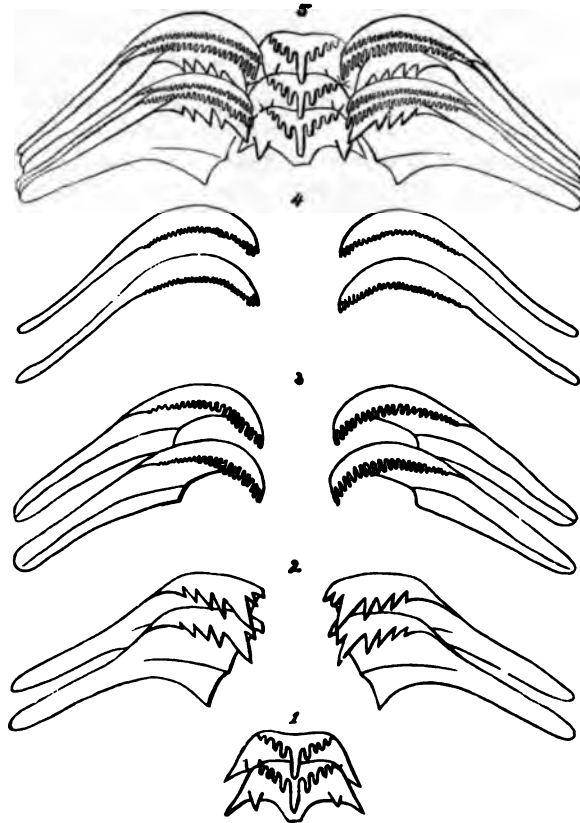
"There is a marked variation in the character of the denticles on the intermediate and lateral teeth. On the intermediate they are large,

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\*It is proposed by Mr. Beecher and the senior writer to give to this tooth the name of *admedian*. In a forthcoming monograph of the *Rissoidea* that name will be constantly so employed.

angular, and somewhat irregular. The lateral teeth are uniformly marked by a regular fringe of slender denticles, which are much smaller on the outer lateral.

"Some portions of the membrane and different specimens show considerable variation in the length and strength of the denticles on the lateral teeth, and sometimes their number seems subject to some mutation. The numbers given in the formulæ were averaged from several enumerations, and represent the comparative denticulation of the teeth."



DESCRIPTIONS OF FIGURES.

(All figures enlarged to 500 diameters.)

- FIG. 1.—Rhachidian teeth.  
 " 2.—Intermediate teeth.  
 " 3.—Inner laterals.  
 " 4.—Outer laterals.  
 " 5.—A portion of the odontophore, representing the teeth in their natural position.

This species has a limited distribution, occurring only, so far as present information goes, in North-western Nevada, in Walker and Pyramid Lakes. Living forms have been collected only in the last-named locality.

The description of Dr. Stearns has been amended to form a diagnosis as complete as very extensive series would permit. The shell is exceedingly variable, ranging from short and stout to long and slender, and from strongly carinate to entirely smooth. Figures 6, 7, and 8 of Plate II. show the smooth forms and the variations to which they are inclined.

***Pyrgulopsis mississippiensis*, sp. nov.**

(Plate II., Figs. 14-16.)

*Pyrgula scalariformis*, var. *mississippiensis* Pilsbry.—Am. Nat., Jan. 1886, p. 75. No description.

Shell minute, pupiform, elevated, imperforate; whorls  $5\frac{1}{2}$ –6, flattened, with a well-marked carina on lower third, which becomes central on periphery of last whorl, body-whorl equal to one-half entire length of shell and bluntly angulated at position of carina; epidermis ———; suture distinct, deeply impressed only at commencement of last whorl and below, above last whorl covered by carina; aperture narrowly ovate, broadly rounded before and narrowly rounded behind, very oblique; peritreme continuous, almost rimate, slightly reflected over the parietal wall; lip simple, sharp.

Animal unknown.

This form has hitherto occurred only in the Mississippi River, near the mouth of Rock River, on the Illinois side — Rock Island County, Illinois. Many dead specimens have been taken, but, as yet, no living ones. It differs in important particulars from the *P. scalariformis*, Wolf, which is "carinate its entire length," has a different aperture, and is markedly different in the character of the sutures. Our species is ecarinate on all whorls above the body-whorl, the carina being depressed and filling entirely the suture. The outlines of the apical whorls are wholly unlike the figured type of Wolf's species. The average measurements of the four specimens upon which the preceding description is based are, for length, 4.66<sup>mm</sup>; for breadth, 1.61<sup>mm</sup>. The proportions of length and breadth, while variable, do not vary within so wide limits as the *P. nevadensis*. The individual measurements are as follows:

<i>Specimen</i>	1.—	Length,	3.58 <sup>mm</sup> ;	breadth,	1.60 <sup>mm</sup> .
"	2.—	"	3.38 <sup>mm</sup> ;	"	1.56 <sup>mm</sup> .
"	3.—	"	3.50 <sup>mm</sup> ;	"	1.64 <sup>mm</sup> .
"	4.—	"	3.40 <sup>mm</sup> ;	"	1.64 <sup>mm</sup> .

**Pyrgulopsis spinosus, sp. nov.**

(Plate II., Figs. 17-19.)

Shell minute, imperforate, turreted, unicarinate, carina modified into spinous processes on last three whorls, darker colored than balance of shell; whorls 5-5½, first two rounded, destitute of spines or carina, the last three somewhat geniculate, angled at location of carina, body-whorl large, sometimes with an occasional spine below the carina; epidermis light horn color, nearly white at apex, with microscopic longitudinal revolving striæ, shining; aperture roundly ovate, slightly longer than broad, rounded anteriorly; peristome not continuous, sharp, simple, slightly reflected near the columella, suggesting a faint umbilicus; suture slightly impressed.

Operculum spiral, reddish horn color.

*Specimen 1.*—Length, 3.86<sup>mm</sup>; breadth, 2.34<sup>mm</sup>.  
           *" 2.*—          "      3.00<sup>mm</sup>;          "      1.88<sup>mm</sup>.  
           *" 3.*—          "      3.06<sup>mm</sup>;          "      1.52<sup>mm</sup>.

*Habitat.*—Comal Creek, a clear stream at New Braunfels, Texas, on rocky bottoms. It was associated with numerous specimens of *Goniobasis pleuristriata* Say, *Amnicola* (species undetermined), and *Bythinella* (species undetermined).

In some particulars this form may be compared with Stimpson's genus *Potamopyrgus*. It differs radically, however, in the character of the spinous processes, which in that type are epidermal, while in our form they are true testaceous products. It is the only spinous rissoid described from the United States.

**Pyrgulopsis scalariformis Wolf.**

(Plate II., Fig. 13.)

*Pyrgula scalariformis* Wolf.—Am. Jour. Conch., Vol. V., p. 198, Plate xvii., Fig. 3 (1869).

"Shell turreted, slender; whorls 6, chalky white; suture deeply impressed; carinate its entire length on the lower edge of the whorls; mouth small, ovate, but slightly connected with the last whorl. Length, one-half inch.

"Post-pliocene; abundant on the Tazewell shore of the Illinois River." (Wolf.)

No other locality has been recorded, and no living specimens have ever been taken. The figure is a copy of the original, and has been the main reliance in referring the species to this genus. We have not been able to procure from the author either the types or authentic specimens for examination.

## A DEFENSE OF OUR LOCAL GEOLOGY.

BY W. H. BARRIS.

[Being a criticism of a pamphlet on the "Geology of Scott County, Iowa, and Rock Island County, Illinois," by A. S. Tiffany. Originally read as an address before the Academy, it is published in such form, rather than as a more rigidly strict scientific paper.]

*Read before the Academy, February 26th, 1886.*

It was an unfortunate venture when the author of this pamphlet proclaimed in the "Naturalist's Directory" that his *forte* consisted in "the correct naming of fossils." His friends had a right to expect that in his first paper on the subject, a claim so conspicuously set forth would be fully substantiated. They certainly were not prepared to recognize within a few pages no less than one hundred and eighty blunders in the correct naming of fossils.\* The printers of the pamphlet, realizing that their reputation for accuracy might be compromised by the occurrence of such blunders, remonstrated; but they were overruled, and given to understand it was just as it should be.

It certainly was unfavorable for the kind reception of the pamphlet that blunders should be allowed to accumulate in such numbers. One, two, or more, might be overlooked; but the presence of so many errors gives rise, most naturally, to the suspicion that the same want of care, thought, and judgment that led to such blunders, even in the naming of fossils, might equally fail to grasp the nice distinctions on which genus and species are founded; in other words, blunders in the correct naming of fossils might pave the way for blunders in their identification. The suspicion is confirmed by the result.

We are confronted with the statement that from the Corniferous limestone developed in this locality have been gathered over two hundred and forty-six species of fossils. We infer the utter improbability that this number of species are found in this locality, from the following considerations:

*First.* The character of the rock is against it. Professor Hall, of our first State Geological Survey, writing of the Corniferous limestone of our vicinity, says: "The large amount of shaly matter mingling with the material of the rock, or occurring as shaly seams between the beds, would appear to render the condition of the ancient ocean unfit for the

\*The errors noted are distributed as follows, viz.: In the first list, page 7, 41; in the second list, page 17, 57; in the third list, page 24, 45; in the fourth list, page 28, 18; in the fifth list, page 29, 3; in the text, 18; making a total of 155.

development of animal life. In nearly all the exposures observed it contains few fossils." \* Professor Hall had access only to the exposures above the city. Since that time quarries have been opened below. The general character of the rock, to some extent, still prevails. That it is unfavorable to the preservation of fossil remains is apparent from the condition in which they are found. It holds them firmly, and gives them up reluctantly. Ground into small fragments before the deposition of the rock, they are compacted into its substance. If large fragments occur, they are generally broken or crushed. Even where a somewhat perfect external form appears, in the majority of cases the finer markings and the delicate organs, on the preservation of which identification depends, are obliterated beyond all hope of restoration. As a general rule, the rarer the fossil the more damaged is its condition. Of the genus *Stereocrinus*, one of our *Crinoids*, of which scattered fragments had been found from time to time, it was not till after six or seven years of exploration that a specimen was found in a sufficiently good condition to warrant description and illustration. In a single instance a reef is formed, abounding in fossils on its upper surface. The most noticeable fact is not the abundance of differing species, but the recurrence of so many individuals of the same species. While they exist in numbers partially weathered, it is to the exclusion of every other form. At the same time, it is so difficult to extricate the individual from the mass, that it would be impossible to find a single well-preserved specimen in any cabinet in the city. From such a character of the rock, we deduce that no great number of species may be expected.

As a *second* consideration, the limited exposures of the rock are against it. In this respect, geologists at a distance, who have never visited us, find it difficult to realize our situation. In proportion as the exposures of a rock are multiplied, extended, as they often are, along a river or some other natural exposure, or cropping out at intervals throughout a State, in that proportion we look for abundance of species. We emphasize this fact. Our whole Corniferous limestone in its fossiliferous portion comprises simply two or three slight exposures above the city—now almost obliterated—a slight show between Rock Island and Moline, also at Milan, and two or three small, insignificant quarries below the city. This is the whole extent of the fossil-bearing limestone as exposed in our vicinity. We are told that out of this have come two hundred and forty-six species of fossils.

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\* *Geology of Iowa*, Vol. I., p. 84.

A *third* consideration opposed to such statement is this: The experience of all other geologists is against it. No geologist from abroad ever visited our quarries without a disappointment, both as to the number of fossils obtained and the unsatisfactory condition in which they were found. I might appeal to every member of the Academy who has ever wrought in this rock, as to the want of success that has invariably attended his labors. A whole summer's work may be summed up thus: Much time spent, many visits made, and few fossils found. And hence the universal surprise expressed at the statement of the author of this pamphlet, that in this meagre locality he had collected no less than two hundred and forty-six species of fossils.

Taking into consideration the character of the rock, the fewness of its exposures, the uniform testimony of all other workers in the rock, the statement of the author as to the number of species collected will never be credited by any practical geologist. There will be a suspicion that the number of blunders in the matter of identification will equal, if not far exceed, the number of blunders already referred to.

As a *fourth* consideration, such a number of species is not favored by a comparison of this with other localities. A test case might be reached, could we find elsewhere in the Corniferous limestone an exposure as limited as ours, and with rock of similar character. Failing to do so, and using such material as I have access to, I compare the small with the great. Certain facts in the geology of the State of Michigan may aid us in this matter.

It will be remembered that Professor Rominger, the present State Geologist, has drawn no line between the Corniferous limestone and the Hamilton group, but treats them as one formation. It extends on the eastern shore of Lake Michigan from twenty to twenty-five miles, with a far greater exposure on the western shore of Lake Huron, bordering rivers, inland lakes, and islands. In places, particular exposures are measured, not as ours, by the rod, but by the mile. Professor Winchell, of the first Geological Survey, writes: "Twenty rods west of this locality is a more considerable exposure, extending along the beach for three-quarters of a mile, and forming an escarpment which, at some points, attains an elevation of thirty-five feet."\*

Professor Rominger says of Khagashewung Point: "For more than a mile's length it is lined with vertical rock bluffs, about fifteen feet high."†

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\* Report on the Grand Traverse Region, p. 41.

† Geological Survey of Michigan, by Professor Rominger, Vol. III., p. 58.

These two exposures, in extent of surface, exceed ours a hundred, if not many hundred times. So much for extent of rock.

Another equally important fact is its prevailing fossiliferous character. In many places, limestones and shales are absolutely crowded with fossils, many of which are in an excellent state of preservation. Professor Rominger writes in reference to the shoals near Thunder Bay Island: "The exuberance of fossils is most beautifully exhibited. One sailing on them can see for miles the whole bottom paved with corals in convex lumps, from a few inches to some feet in diameter, their white sparry substance contrasting beautifully with the dark limestone which incloses them."\*

Professor Winchell says of a certain coral: "Fine specimens of this coral can be collected in any quantity, even to a shipload."†

With such extensive exposures of rock, in many portions crowded with fossils, we ask as to the number of species that are found. If our meagre exposure, measured by a few rods, affords two hundred and forty-six species and more, may we not expect a proportionate increase in number with miles of exposure, its profusion of fossils, two of the most accomplished geologists of the day engaged in the survey, and the wealth of the whole State of Michigan to back them in their work? What is the result? Professor Winchell thus writes: "The table which follows embraces a list of all the fossils thus far collected, including the collections of my recent survey, and those heretofore made by State authority."‡ That list furnishes ninety-two species. In addition to these, Professor Rominger enumerates seventy-five more. Thus the results of the two geological surveys of Michigan are one hundred and sixty-seven species. In other words, the whole State of Michigan has furnished not far from two-thirds as many species as are found in our few small quarries and neighboring exposures. Is it probable?

The same survey furnishes us with another equally pertinent illustration. A family of corals, known as the *Cyathophyllida*, exists in the Hamilton of Northern Michigan, at times in as wonderful state of perfection as when the *polyp* lived in its cell. In this locality the whole internal cavity is filled with foreign material which cannot be removed without injury to the structure, and yet on this internal portion, more than any external character, the identification of this class of corals depends. Of this one family of the *Cyathophyllida*, in its two members of

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\*Geological Survey of Michigan, by Professor Rominger, Vol. III., p. 47.

†Report on the Grand Traverse Region, by Professor Winchell, p. 41.

‡Report on the Grand Traverse Region, p. 85.

*Cyathophyllum* and *Zaphrentis*, Professor Rominger has noted and illustrated nine species, and Professor Winchell about six, making a sum total of fifteen. This pamphlet credits our limited locality with thirty-three—more than twice as many as are found in the whole State of Michigan.

I pause for a moment over another feature of this pamphlet. It is admitted that certain fossils not only have a wide range, but reappear in successive formations. But it is an unheard of phenomenon, until this pamphlet broached it, that, in any locality circumscribed as ours, out of two hundred and forty-six species, one hundred and fifty-nine are characteristic of the Corniferous limestone, and eighty-seven are representatives of other and distant rocks. It reaches the proportion of almost two-thirds of the whole number reported as found. Call the roll, and Trenton responds, 1; Clinton, 3; Niagara, 14; Guelph, 1; Lower Helderberg, 5; Onondaga, 3; Schoharie Grit, 7; Oriskany, 3; Corniferous, 159; Hamilton, 35; Tully, 2; Chemung, 2; Burlington, 1; Upper Helderberg, 2; Marcellus Shale, 2; 28 so unfortunate as to be unnamed.\*

That such a heterogeneous assemblage should mass itself within the compass of our few quarries is an anomaly having no parallel within the range of geological investigation.

The identification of fossils is a work of acknowledged difficulty, even with the best of facilities. In proportion as there is a deficiency in authorities and means of comparison, especially if the fossils are in a poor state of preservation, the difficulty is greatly enhanced. Illustrations of this difficulty abound. One can scarce go amiss for them.

Professor White, of the Smithsonian Institution, gives two figures of a certain coral so common that ninety-nine out of a hundred collectors would not hesitate to name it. He declines either to describe or identify it, on the ground of the necessity of a thorough revision of the fossil corals of our country, and the consequent doubt that is naturally felt as to the correctness of specific determinations by means of merely the external features. External characteristics, it is true, will always remain valuable aids in the specific determination of fossil corals; but in the present state of paleontological science one is not justified in omitting microscopic and other details of internal structure.

Professor Worthen, of the State Geological Survey of Illinois, thus writes of a certain spirifer: "This shell seems closely allied to several

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\* Pamphlet, p. 19.

forms described by Professor Hall under other names, but not figured. Until all these have been fully illustrated, it is impossible to make detailed comparison without specimens of all these forms." \*

In the State of Michigan a particular shell abounded to such an extent that the rock containing it took its name from the shell. It was known as the *Tropidoleptus* bed. Subsequently, Professor Winchell writes: "The term *Tropidoleptus* beds is changed to *Bryozoa* beds, since the supposed *Tropidoleptus* proves to be a *Strophodonta*, an entirely different species." †

Professor Hall, of the State Geological Survey of New York, has more than once claimed that other paleontologists had entirely misunderstood his descriptions. They had not only failed to identify, but out of fossils he had described they had made new genera as well as species. In the twentieth report on the New York State Museum of Natural History several pages are devoted to such controversy.

These are representative men — acknowledged authorities in all that pertains to the science of paleontology. Was there ever a more uniform testimony than that which is thus borne to the difficulty of determining species?

Will not errors increase in proportion to our lack of these opportunities? With limited means, limited time, limited education, limited experience, limited libraries, and limited cabinets of fossils, will not our work show the effect of such limitation? Errors will and must abound. Is this work of identifying two hundred and forty-six species from our few quarries a perfect work? Is this pamphlet an exception to all other writings on paleontology?

I put in compact shape the points on which I have touched:

It is improbable that such a number of species should be found in the Corniferous limestone of our vicinity, for these reasons:

*First.* Because of the character of the rock.

*Second.* Because of our very limited exposures.

*Third.* Because their occurrence in such numbers is against the experience of every other worker in our rocks.

*Fourth.* Because, in comparison, Cook's quarry and vicinity are made to furnish one and a half times as many species of fossils, and twice as many of a certain species of coral, as have been discovered by the two geological surveys of the State of Michigan.

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\*Geological Report of Illinois, Vol. III., p. 434.

†Geological Report on the Grand Traverse Region, p. 84.

*Fifth.* Because the testimony of the most distinguished paleontologists of our day is that the difficulty of determining species is so great that errors in identification abound under the most favorable circumstances.

This improbability accumulates with each consideration, till we do not hesitate to say that, in our limited exposures of the Corniferous, two hundred and forty-six species never have been, and never will be, realized. In the list occurs the names of fossils that are not found within five hundred miles from Davenport.

I have thus spoken of the paleontology as set forth in this pamphlet. I pass to a consideration of its geology.

This pamphlet is as significant in what it leaves out as in what it puts in. On page 19 we read: "No fossils have been published as having been collected in the Corniferous or Upper Helderberg, in either of these counties, in the Iowa or Illinois geological reports." The inference is plain that, since the publication of those reports, no investigations have been carried on in the geology of our locality, except those proclaimed in this pamphlet.

Some years since the Academy published papers on our local geology, accompanied with illustrations and descriptions of new fossils. We place side by side some of the statements made in those papers and in this pamphlet—the likeness is suggestive:

Those papers first gave to the quarries below the city the name "Corniferous." This pamphlet says, "Corniferous."

Those papers first divided the rock into two parts—the fossiliferous and the non-fossiliferous. This pamphlet accepts such division.

Those papers first defined the extent of the fossiliferous portion. This pamphlet recognizes the same boundaries.

Those papers stated that the Cathedral was built of the non-fossiliferous rock found above the city, and Trinity Church of the fossiliferous rock found below the city. This pamphlet says, "Churches and dwellings are built of this stone."

Those papers characterized the rock as most durable. This pamphlet says, "It shows no signs of disintegration after thirty years exposure."

Those papers first noted the frequent recurrence of large, cavernous openings of greater or less extent. This pamphlet speaks of "numerous large pot-holes excavated in the Corniferous limestone."

Those papers stated that these cavities were filled with sand and shale from the coal-measures. This paper says "filled with arenaceous shales of the coal-measures."

One can scarcely tell which is which. He is reminded of the Siamese twins, Chang and Eng, with only this difference, that the papers of the Academy were born several years in advance of this pamphlet. Indebted, as it is, to the Proceedings of the Academy for the facts presented, the conclusions reached, and adopting, to a great extent, its very language, would not the commonest courtesy suggest an acknowledgment of such indebtedness? Why no recognition of those papers? Simply because to ignore the work done by the Academy would give a certain notoriety to the pamphlet that would attract attention as the *only* work done in our local geology since the publication of the last geological surveys, to which the author of this pamphlet is plainly indebted for much of what value it possesses, but which he chooses to utterly ignore, instead of acknowledging his indebtedness thereto, as simple justice demands.

It is folly thus to attempt to ignore the work done by the Academy. In this, as well as all other departments of scientific research, it has sought the truth for the truth's sake. It has done good work in various branches of scientific inquiry. It has made stable additions to the sum total of exact science. It has gathered rich treasures of material and intellectual wealth, and it proposes to care for and defend them. It cannot afford to let this pamphlet go out as by a member of the Academy, without a protest against its scientific inaccuracy and its misleading inferences.

## VOLCANOES OF THE SANDWICH ISLANDS.

BY C. S. WATKINS.

*Read before the Academy, May 28th, 1886.*

THE newspapers announce that the lake of lava at the volcano of Kilauea, Island of Hawaii, Sandwich Island group, has recently disappeared, leaving only a bottomless pit, where formerly, even in its quiet times, a pool of liquid, molten, almost boiling lava, about seven hundred yards in width, has been.

As I visited those regions in 1854, and noted some facts that seem to bear upon this subject, and that I have never seen stated or referred to by other visitors, it has occurred to me that, just now, a report of my observations may not be out of place.

*Preliminary.*—The entire Sandwich Island group is very evidently of volcanic origin, and of regular succession in order of creation. From the extreme north-western end of the group to and including Hawaii—the last of the cluster—a distance, in an almost straight line, of about four hundred miles, in a nearly south-easterly direction, each successive island is larger, the intervening distance between the centres is greater, and the volcanic remains evidently of more recent origin than at its immediate predecessor. In this rough statement the three or four smaller islands near Maui are regarded as merely detached portions of the main island.

The group begins at the north-western end with a nameless, uninhabited, and almost submerged, nearly level island, the composition of which is evidently the usual lava and cinder scoria resulting from volcanic fires. In size the visible portion of this is scarcely a mile in diameter. About ten miles south-east from this point is Nihau, twelve miles in diameter, hilly, with lava rocks, but no traceable volcanic cones or mounds. Twenty miles south-east, or nearly so, is Kauai, the first inhabited island. Kauai is twenty miles long, ten miles wide, and the hills and rocks testify very plainly to their volcanic origin. Thirty-five miles from Kauai, in the same continuous line, is Oahu, twenty-five miles in diameter, and with unmistakable evidences of much more recent creation. Honolulu, the capital city of the Hawaiian kingdom, is on this island. Within a radius of five miles from the city are at least seven volcanic mounts, one or two hundred feet high, and with clearly defined craters in good preservation. Next, at a distance of about fifty miles, is the island of Maui, on which is the

town of Lahaina, a seaport of considerable local commerce. Maui is twenty miles in width and fifty miles in length, and, strictly described, is really a union of two separate islands of nearly equal size with three or four smaller islands—evidently offshoots—within a few miles. Here the majestic, volcanic cone, Haleakala, ten thousand feet in height and as clear-cut as if but lately made, is the leading feature. Although a dozen or more of sub-volcanoes have had outbursts on its sides and at its base, yet the symmetry of the original cone is unimpaired. Up to, and including, this island, there are no active volcanoes; and even the traditions of the natives have no allusion to such disturbances. In fact, it is decidedly questionable if human life could have existed on any of the islands thus far spoken of until so long after all volcanic action had ceased thereon that the lava had become sufficiently decomposed by the influences of "climate and time" to have formed a soil sufficient for a permanent growth of vegetation.

Nearly one hundred miles from Maui, still south-east, is Hawaii, the largest and, thus far, the final island of the group. Hawaii is seventy-five to one hundred miles in diameter, very rocky and hilly, and, until a few months, had the volcanic influences still active and visible. On Hawaii are the old, extinct volcanoes, Hualalai, fourteen thousand feet in height; Mauna Kea, sixteen thousand feet; and Mauna Loa, seventeen thousand feet from the sea level to its summit. These three are evidently of successive formation, and each is clearly defined as if created in the present century. It may convey an idea of the magnitude of one of these to state that the crater of Mauna Loa is seven miles in diameter and one and a half miles in depth—large enough to receive and conceal our Mt. Washington, if inverted, into its cavity. No eruptions at either of these summits have occurred in at least the past hundred years. The volcano of Kilauea, from which all modern outbreaks have proceeded, is really a side issue of Mauna Loa; and its crater, about one mile in diameter, is at an elevation of nearly five thousand feet above the sea level. The lake of liquid lava of which we read was about two thousand feet in diameter, and it was from this source that all the eruptions of late years have proceeded.

And now, having given a rough-drawn and non-scientific outline description of these islands, I come to the feature which induced this writing. Several years previous to my visit in 1854, captains of vessels had, on repeated occasions, reported having passed through waters in violent agitation, in calm weather, and had suggested that this agitation was caused by a sub-marine volcanic eruption, active at the bottom of the sea; and each of these reports located the disturbance as being

about five hundred miles south-east from Hawaii. It was also noticed that, at about the dates thus mentioned, "tidal waves" of enormous size and power washed both shores of the Pacific almost simultaneously, thus manifestly originating at a common central point, which, as near as could be estimated, was not far from the region of the above-reported sub-marine volcano.

The specific point to which, it seems to me, intelligent attention might appropriately be directed, is as to whether the indications and disturbances thus known during at least forty years, taken in consideration with the recent disappearance of the lava lake at Kilauea, and with the herein described formation system of the existing islands, justify the suspicion that the Sandwich Island group may, at no distant day, have an addition to its number. If so, it may then be of scientific interest to have an accurate investigation of the points I have herein called attention to, as to the comparative and successive increase in size and distance of each island. However, at this time I am only "placing on file" this rough exhibit. Many years may pass before the subterranean machinery will make another chapter of this history possible.

And now, in conclusion, while on this subject, I may state another puzzling feature, though of a philosophical and speculative, rather than of a scientific, character. I must, as a prelude, say that I was on the Islands on a roving tour, about three months, and acquired quite a mastery of the simple language of the islanders (eighteen letters compose their entire working alphabet), and thus got much information direct from the natives. One story I found so unvaryingly told in all the Islands that there can be no doubt as to its antiquity. It was this: "The volcanic outbursts at Kilauea are caused by the ebullitions of 'wrath of the goddess Pele — the long, fine, grass-like substances thrown 'out at such times are 'Pele's hairs,' torn by the angry goddess from the 'heads of those of her subterranean subjects that she at such times gets 'her hands on. This goddess Pele was once a queen in Heaven, but, 'having got into a row with the head of the family, was, after a series of 'revolutionary conflicts, conquered and ignominiously banished to the 'lower regions, etc., etc.'" Captain Cook found this tradition prevailing at the time of his discovery of the Islands, and it is still firmly believed. It really seems that John Milton's patent on the central idea of Paradise Lost could be successfully contested by the king of the Sandwich Islands as heir to the belongings of his Kanaka ancestors.

I have only to add that, writing from memory of the rambling observations made thirty-two years ago, I cannot aver that the directions and dimensions herein given are closely accurate. The outline features, however, as I have stated them, are unquestionably, in a general way, correct.

**HARFORDIA, Greene & Parry.****A New Genus of Eriogonææ, from Lower California.**

BY C. C. PARRY.

*Read before the Academy, July 9th, 1886.*

WHILE the remarkable Eriogonous genus *Pterostegia*, Fisch. & Meyer, has been long known among botanists in a very common California species, *P. drymarioides*, F. & M., a second species from Lower California, collected in one of the early voyages of discovery on the Pacific coast, and described in "Botany of the Sulphur" as *Pterostegia macroptera*, Benth., has been long a *desideratum* in scientific herbaria. Only as late as 1882 additional material was procured by Mr. L. Belding from near the original locality, and fragmentary specimens of the same were contributed to the Gray Herbarium, at Cambridge, Massachusetts. The year following a single fruiting branch was presented to the writer by Gen. William Le Duc, who, attracted by the showy involucre, put a fragment in his pocket-book while on a mining excursion down the Lower California coast in the spring of 1883. In the spring of 1885, Prof. E. L. Greene, of the California Academy of Science, in his interesting botanical trip down the Pacific coast as far as Guadaloupe and Cedros Islands, secured ample specimens of what, on subsequent examination, he regarded as two distinct species, which were described by him in Bulletin of the California Academy, IV., pp. 212, 213, as *Pterostegia galioides* and *P. fruticosa*—not being aware at the time that the former was identical with *P. macroptera*, Benth., which, according to the published descriptions, represented only a low herbaceous plant. Unfortunately, owing to the lateness of the season, Mr. Greene's specimens did not contain the characteristic flowers, his description of the floral organs being derived only from the fallen fruit. Previously, however, Mr. Greene, as Botanical Curator of the California Academy, had found in Dr. Veatch's collection of 1859, from Cedros Island, a single fragment of one of the above species, so characteristic, as he afterwards noticed, of the peculiar vegetation of that island. Before, however, reaching the conclusion, from the data then in his possession, of including these remarkable plants in the genus *Pterostegia*—so different in habit and general character from the typical species—Mr. Greene intimated a probability that more complete material, including the floral organs, might justify the establishment of a new genus, for which he

suggested the name HARFORDIA, in compliment to the long-time efficient Curator of the California Academy of Science, and for many years previously a zealous collector of Pacific coast botany — Mr. G. W. H. Harford. Now, at last, as one of the fruits of the present season's (1886) collections, I have just received from my zealous correspondent, C. R. Orcutt, of San Diego, lately returned from an extensive and arduous land trip into the arid districts of Lower California, complete flowering specimens of one of the species above referred to, being identical with the *Pterostegia macroptera*, Benth.; *P. galioides*, Greene. From the specimens thus obtained, a careful examination reveals such remarkable and unexpected floral characters, that, fully confirming the surmises of Mr. Greene, will require the establishment of a new genus, which, in cordially carrying out his suggestions, I venture herewith to characterize, viz.:

HARFORDIA, Greene & Parry.

Diœcious! rarely monœcious; pistillate flowers single, involucrate; involucre monophyllous, the folded edges forming a winged central crest, laterally bilobed and gibbously bisaccate. accrescent in fruit, hyaline and reticulated with deep red veins; staminate flowers without involucre! in axillary clusters on an irregular axis, more or less prolonged; pedicels jointed at the summit. hispid below; perianth 6-parted, stamens 6–9, in two rows, anthers oval; pistillate flowers persistent, much shorter than the developed akene, 6-parted, with 9 staminodes in two rows at the base; styles short, recurved, stigmas capitate; akene smooth, oblong, acute narrowly winged; embryo axile, excentric, radicle as long as the oval cotyledons. Suffruticose or shrubby perennials, with jointed stems, opposite connate leaves, dichotomously branched, with irregular fasciculate leaves, and flowers in the upper axils. Differs from *Pterostegia* in its perennial habit, its axile excentric embryo, and from all known *Eriogonæ* in its diœcious flowers. Confined in its geographic range to the arid districts of Lower California, and adjacent islands.— *Pterostegia*, Benth. & Hook., Gen., Pl. III., p. 94, in part.

Two species, viz.:

1. H. MACROPTERA.— *Pterostegia macroptera*, Benth., l. c.— *P. galioides*, Greene, l. c.

Suffruticose, diffusely branched from a thick ligneous axis, hoary with appressed pubescence, branches slender, jointed, with swollen nodes at the junction of the opposite connate sessile leaves; leaves entire

thickish, narrowly spatulate, one-fourth to one-half inch in length; involucre broadly bilobed, and conspicuously inflated on each side, hyaline with deep red reticulations; staminate flowers axillary, on a more or less prolonged axis, without bracts, except an irregular ciliate tuft at the base of the pedicels; perianth short-campanulate, deeply 6-cleft, segments nearly equal; stamens 9, in two rows, at the base, with occasional traces of undeveloped ovaries; pistillate flowers shorter, persistent, and adhering to the developed akenes, 6-parted, with two rows of pedicellate staminodes at the base; akene and embryo as above noted.

*Habitat*.—Lower California, from San Quentin to Magdalena Bay, flowering early in the season; staminate plants more diffuse, with shorter joints and less prolonged branches. Mr. Orcutt's specimens, No. 1374, April 17th, 1886, from San Telmo, show all the peculiar characters of this species.

2. H. FRUTICOSA, Greene, ined.—*Pterostegia fruticosa*, Greene, l. c. (Copied from Mr. Greene's original description, Bull. Cal. Acad., IV., pp. 212, 213.)

"Shrubby, diffusely branched, firmly erect, 2–4 feet high, densely leafy; branchlets short-jointed, tomentulose at the joints; leaves glabrate, fleshy, obovate-spathulate, entire obtuse or retuse, 2–5 lines long; involucre firm-hyaline, reddish, with darker reticulate veins, 5–7 lines long, deeply cleft into two entire reniform lobes; wings reniform, entire unequal; akene ovate, lanceolate two lines long, sharply triquetrous; perianth a half line long, persistent."

*Habitat*.—Cedros Island: Dr. Veatch, 1859; E. I. Greene, May, 1885. Not feeling at liberty to modify Mr. Greene's original specific description in referring it to his proposed new genus, it is only necessary to add that, in the absence of staminate flowers, it can only be provisionally attached to this genus by its close similarity to the preceding species till confirmed by complete specimens.

## AN ANCIENT MINE IN ARKANSAS.

BY WM. A. CHAPMAN.

*Read before the Academy, May 28th, 1886.*

IN the spring of 1884, while engaged in prospecting for minerals over the southern portions of Polk County, Arkansas, my attention was directed to an excavation, supposed by those who now reside in that locality to have been the work of Spanish miners, who, local traditions state, were once actively engaged in the exploration of this State for gold and other precious metals. My curiosity regarding this so-called Spanish mine being aroused, I decided upon a visit to it, in order to determine, if possible, who the miners were and what had been the object of their labor. After going about two miles north-west of Hatton post-office, I came to a spur-like appendage of the mountain, which, jutting out from the main range, formed one side of a narrow, gorge-like valley, through which, in times past, a stream of considerable size had wound its way. Through the erosion of water, a part of this hill had been removed, in such manner as to give to one facing the opening the impression that the dip of the exposed strata was in two directions. It was evident that this face of the hill had once been an overhanging cliff, with all the members of the series of rocks entering into its structure fully exposed; but the falling of the overhanging mass and the accumulation of rubbish from the mine have in a measure restored the base, and now conceal the greater part of the strata from view. The strata open to inspection — some twenty feet — are metamorphic sandstones, ranging in hardness from a soft, friable, amorphous sandstone to that of a quartzose rock of crystalline structure, suitable for millstones. These form the mass of the exposed strata. Above them are others which have distinct cleavage lines at right angles to each other, and which, under atmospheric influences, display a tendency to part along the cleavage lines. Interstratified with these are irregular masses of hornblende and a white, close-textured rock resembling novaculite. The thickness of the strata varies from two to twenty-six inches. The strike of the series is 10 degrees north of east; the dip, northward at an angle of 45 degrees.

The mining operations had been confined to the removal of a single stratum — the lowest of those open to inspection — portions of which

had been left at short intervals as supports to the rock above. The opening to the mine began at a point about twenty feet below the summit of the hill, and extended from thence diagonally downward for a distance of forty feet. A superficial examination convinced me that iron tools had not been employed in the removal of the rock, and hence it seemed exceedingly improbable that the opening before me was the result of European labor. Believing the discovery to be of some importance from an archaeological point of view, I proceeded to make a thorough examination of the excavation, a task rendered comparatively easy, as the greater part of the debris had been removed a short time prior to my visit by a person who was in search of silver ores.\* Provided with a candle and a slender pole, I descended into the opening, which is about two feet in width, and found that for a depth of eight feet no effort had been made to enlarge the opening by the removal of either of the adjacent strata, both of which are exceedingly hard and quartz-like in structure. The miners, at this point, had ceased to drift upward along the strata, and had commenced the sinking of a narrow shaft. After removing the rubbish from this shaft, its depth was found to be less than five feet. Evidently, the intention of the miners, in sinking this shallow shaft, had been the formation of a face or breast in the rock, to serve as a starting-point from which they might tunnel in an opposite direction to that pursued in the drift above, for, opening out from the bottom of this shaft, was a low passage leading down and under the mountain. After carefully exploring as much of this passage as was within reach of my pole, I proceeded to enter, but, in order to do so, was obliged to go upon all fours. Crawling in this manner for some four or five feet, the passage was found to increase in height to such an extent that an upright position would have been possible, had it not been for the incline of the strata and the narrowness of the passage. The descent here was at a sharp incline, and had been accomplished by means of shelf-like offsets cut into the rock. Traces of fire were plainly visible in and upon the rock at the entrance to the tunnel, and the smoke-blackened walls were so seamed and checked by cracks and crevices as to demonstrate the alternate use, by the miners, of both fire and water in their efforts at breaking down the rock. A further search revealed the mineral *desiderata* of the miners. The soft, friable sandstone, to the removal of which the miners had confined their efforts,

\*The alterations effected by that individual, in the appearance of the mine, were of no importance, inasmuch as they were confined to the surface and related entirely to the removal and replacement of a part of the stone supports by others of wood.

proved to be the vein-stone. In it were pockets or cavities filled with a black and a red mineral substance, both pulverulent in form. Descending a few steps farther, my progress was arrested by a large rattlesnake, which I left unmolested in full possession of the lower depths of the mine and the treasures it might contain, and hastily made my way upwards. The black mineral substance proved, upon subjecting it to a qualitative test, to be sesquioxide of iron, with traces of manganese. That these minerals, in the form here found, were those sought for by the miners is evident, as in the near vicinity of the mine are large quantities, exposed, of hematite, limonite, pyrolusite, and psilomelane, which could have been secured at a far less expenditure of labor. That these minerals were of great importance in the domestic economy of the mining people is none the less evident in view of the excessive labor and hardships undergone in its acquisition.

The peculiar method of mining, together with the absence of those markings which would inevitably have followed the use of iron tools, demonstrate that the work was not that of civilized man. Neither will those who are conversant with the characteristics of Indian peoples (applying the term in its generally accepted sense) admit that the excavation was the result of their labor. That the labor was that of some aboriginal people is most evident, and that they were of those whom we know of as Mound-builders is exceedingly probable, inasmuch as there are, within a few miles of the mine, abundant traces of the presence of that people in times past. To these evidences, which seem to designate the Mound-builders as the miners, has been added the following data, obtained while exploring a mound some eight miles distant from the mine. This mound was apparently of very recent origin. (Sketches of it, with such data as I succeeded in collecting, and some of the relics found in it and in the mine, were forwarded by me to the Smithsonian Institution.) In construction it differed materially from all I had heretofore seen. In it, among other relics, were fragments of pottery of a purple-black color. A portion of this coloring matter, when subjected to a qualitative examination, gave results precisely the same as those derived through the analysis of the mineral procured from the mine. The only difference in the two substances I was able to detect, through means then at my command, was the presence of carbonate of calcium, magnesia, and alumina in the coloring matter of the pottery. The presence of these substances, however, is easily accounted for, as, in the endeavor to procure a sufficient quantity of the coloring matter of the pottery for analysis, portions of the

pottery itself were unavoidably included. Those three substances, with silica, are the ingredients of the material used in the manufacture of the pottery — the first two (carbonate of lime and magnesia) in the form of pulverized shells. From the foregoing it would seem that the mineral procured from the mine had been utilized (in part, at least) as a pigment.

Future explorations in the ancient mines and in the numerous mounds of this State will, no doubt, give much additional light upon this and other matters relating thereto; and from the success which has attended the efforts of those engaged in such explorations here, it is by no means improbable that when these extensive and, as yet, almost unexplored fields of research are entered by those whose means will permit them to diligently and systematically prosecute this branch of scientific research, Arkansas will, in their hands, prove fruitful in the yielding of invaluable and, perhaps, unexpected results having an important bearing upon the elucidation of the history of the Mound-builders.

## DESCRIPTION OF A NEW HYDROBIA, WITH NOTES ON OTHER RISSOIDÆ.

BY HARRY A. PILSBRY.

*Read before the Academy, July 30th, 1886.*

### **Hydrobia texana**, sp. nov.

(Plate III., Figs. 1-6.)

SHELL small, conically elevated, rather acute, thin; whorls five to six, convex, lightly striate transversely, with numerous coarse, irregular, revolving striæ, becoming less distinct on body-whorl; sutures well impressed; aperture ovate, somewhat angled posteriorly, rounded before; peritreme simple, acute, not sinuous, adherent to body-whorl, sub-reflexed at the narrow but well-defined umbilicus. Epidermis dull greenish-brown or gray; operculum ovate, sub-spiral, corneous, closely fitting the aperture, with coarse wrinkles radiating from inner margins of whorls; polar point close to columella. The measurements of three specimens are as follows:

- |    |                              |                               |
|----|------------------------------|-------------------------------|
| a. | Length, 4.50 <sup>mm</sup> ; | breadth, 2.50 <sup>mm</sup> . |
| b. | " 3.45 <sup>mm</sup> ;       | " 1.98 <sup>mm</sup> .        |
| c. | " 4.00 <sup>mm</sup> ;       | " 2.00 <sup>mm</sup> .        |

*Habitat*.—Guadalupe River and its tributary, Comal Creek, Comal County, Texas.

The spiral striæ are irregularly developed, the upper ones being most constant. On some specimens there is a more prominent, slightly nodose, revolving line above the periphery. Specimens may be seen in the collections of the Davenport Academy of Natural Sciences, the Philadelphia Academy of Sciences, and of the writer. The revolving sculpture at once distinguishes this species from the *Hydrobia seemani* of Frauenfeld,\* which it resembles somewhat in outline. A comparison with Frauenfeld's figure shows the Texan shells to be of slightly stouter form. It is quite distinct from other described American species. The specimens were found on the under side of stones in rapidly flowing water. Its associates in Comal Creek are *Goniobasis pleuristriatus* Say, *G. comalensis*, sp. nov., and an undetermined *Amnicola*.

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\* Described from Durango, North-west Mexico. *Vide* Verh. K. K. Zool.-bot. Ges., Wien, p. 1025, 1863, also p. 505, 1865 (figured).

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[July 12, 1887.]

This species is placed in *Hydrobia* because I do not know what other disposition to make of it. It is, perhaps, congeneric with such species as *Amnicola floridana* Frauenfeld,\* which has a more acute apex than *Bythinella*, and is slenderer than *Amnicola*.

NOTE ON *Pyrgulopsis spinosus* Call & Pilsbry.

I find that this species has no affinity with the other shells included under *Pyrgulopsis*. Its position seems to be in *Potamopyrgus* or in an as yet undefined genus. *Pyrgulopsis* C. & P. is, perhaps, in characters of shell, not separable from *Lyrodes* of Doering, the description of which I had not seen at the time *Pyrgulopsis* was proposed. A thorough examination of the anatomy of these snails, and comparisons with that of *Pyrgula* s. s., must be made before the true value of all these groups can be determined. To facilitate comparisons by those who do not have access to the publications containing Mr. Doering's papers on mollusca, I copy here his diagnosis of *Lyrodes*:†

Testa subperforata elongata, ovato-conica, tenuis, hyalina, carinata, sæpius aculeata, vel spiraliter lineata.

Animal pede oblongo, antice sublyræ-formi, lobis duo in corpore retractilibus; postice lanceolato; tentaculis subconicis, baculiformibus; rostro brevi.

The type is *L. guaranitica* Doer. The old species *Paludestrina andecola* D'Orb., included by Stimpson in *Pyrgula*, and *Paludina coronata* Pfr., are placed by Doering in the group. The animal resembles *Pyrgula bicarinata* as described by Moquin-Tandon in external characters, the foot being bluntly bilobed before — not distinctly auriculated, as in *Bythinella*, *Amnicola*, and other genera.

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\* *Hydrobia wetherbyi* is probably a *Gillia*.

† Boletín de la Academia Nacional de Ciencias en Córdoba, Tomo VII., 1885, p. 461; *L. guaranitica* figured on p. 463.

**LASTARRIÆA, Remy.****Confirmation of the Genus, with Character Extended.**

BY C. C. PARRY.

*Read before the Academy, October 29th, 1886.*

AS LONG as the Eriogonous genus *Lastarriæa*, Remy., of the Pacific coast of North and South America remained monotypic, and exhibited several apparently anomalous and puzzling characters, it seemed natural, and perhaps excusable, to endeavor to reduce it to systematic arrangement, even by a somewhat forced and obscure construction. Accordingly, the writer, in a recently published memoir on *Chorizanthe* (Proc. Dav. Acad. Nat. Sci., Vol. IV., pp. 45–63), on a careful examination of all the material then at his command, adopted, and has since maintained, the view that the floral organ representing the perianth of previous authors, presenting some of the external characters of a Chorizanthoid involucre, was actually such, and that the perianth proper was in this case reduced to an obscure lobed ring, adnate to the involucre, on which the stamens were inserted—thus merging the genus into *Chorizanthe*, as *C. Lastarriæa*.

On receiving, lately, from my esteemed correspondent, Prof. Federico Philippi, of Santiago, Chili, S. A., a nearly complete set of Chilean *Chorizanthes*—including, with the original, two new species of *Lastarriæa*—a reconsideration of the whole subject was naturally brought up, leading to the following important results:

While the two new species indicated by Professor Philippi conform closely to the published generic character, they do not sustain the views adopted in the paper above referred to; at the same time the specific differences bring more clearly to light other characters, heretofore obscure, which removes at once the most anomalous features of the genus as before understood, exhibiting a clearly defined involucre, enclosing the proper perianth! Thus the five subtending cauline bracts, which in the well known species *L. Chilensis* seem united in a single whorl, in the new species, *L. stricta*, Philippi, show a clearly defined *double* series, including two outer, subtending each dichotomous branch, and comprising the ordinary cauline bracts; three inner, more closely united at base, enclosing a perianth, and therefore representing a proper involucre, not unlike that of *Chorizanthe, polygonoides*. In following this clue, it is not difficult to see even in the closely blended

bracts of *L. Chilensis* also a double series, only obscured by the close similarity of the separate segments.

It thus appears that the suggestion of Professor Gray, contained in a notice of Xantus' plants, as early as 1860, stating that "the verticillate upper leaves of *Lastarriæa* answer to the involucre, which however encloses a proliferous shoot as well as a flower," contains at least half the truth; also the lately published remark of Mrs. Curran (Bull. Cal. Acad., No. V., p. 2,) that "the enclosing bracts of *Lastarriæa* have as much right to the rank of an involucre as those of *Oxytheca, luteola*," may, with the explanation now given, be accepted as nearer the truth than the previous theory of the present writer. With the facts thus brought to light by the interesting discoveries of Professor Philippi, the genus *Lastarriæa*, Remy., may be more clearly defined as follows, viz.:

LASTARRIÆA, Remy.—*Chorisanthe Lastarriæa*, Parry, l. c.

Involucre triphyllous, united at base, segments unequal, more or less thickened and cuspidate-uncinate, closely sessile in the axil of opposite cauline bracts subtending the dichotomous branches and terminal shoots; perianth triangular, coriaceous, 5-6 parted, segments uncinat (resembling the involucre of *Chorisanthe*); stamens 3, inserted on the throat, filaments short, anthers oval; styles short, recurved; akene triangular, embryo straight, with linear cotyledons, and short radicle.

Slender jointed annuals of the Pacific coast of North and South America; differing from *Chorisanthe* only in its 3-bracteate involucre, and its coriaceous, uncinately awned perianth; nearest to Sect. *Acanthogonum*, but differs in its straight embryo.

Three ? species.

1. *L. CHILENSIS*, Remy.—*Chorisanthe Lastarriæa*, Parry, l. c.

Involucral whorls closely adherent, and similar to the external cauline bracts; perianth sharply triangular, coriaceous, segments unequal, with prolonged uncinat awns.

*Habitat*.—Pacific coast of North and South America.

2. *L. STRICTA*, Philippi, ined.

Involucral whorls distinct from the outer cauline bracts, segments broadly oval, retuse, thick-fleshy corrugated, with a prominent keel terminating in a short recurved cusp; perianth membranaceous, segments nearly equal, spatulate, and shortly uncinat.

*Habitat*.—Coquimbo, Chili, S. A. Professor Philippi, 1885.

3 ? *L. LINEARIS*, Philippi, ined.

Smaller, with more linear bracts; hardly distinct from the last.

*Habitat*.—Coquimbo, Chili. Professor Philippi, 1885.

## MOUND EXPLORATIONS AT TOOLESBORO, LOUISA COUNTY, IOWA.

*Read before the Academy, August 2d, 1886.*

THE village of Toolesboro, locally noted for its prehistoric mounds, is situated on a commanding bluff, about two and a half miles above the mouth of the Iowa River, which empties into the Mississippi fifty-two miles below Davenport.

A party from this Academy had opened some mounds here in 1875, obtaining from them a number of interesting relics (see Proc. Dav. Acad. Nat. Sci., Vol. I., p. 106); but, as several of the group remained unexplored, we decided to make another expedition, devoting a week to the trip and the work. Accordingly, on Saturday, July 24th, we started by skiff, carrying camp equipage, etc., and were on hand, ready for work, Monday morning.

The bluff at this point rises two hundred and ten feet above the Mississippi level, and commands a most magnificent view up and down and across the broad valley common to the two rivers. Extending along its brow, through the north-western outskirts of the village, is a row of nine\* large mounds, from fifty to three hundred feet apart, some of which, as stated, had been more or less thoroughly explored — one of them (No. 6) having been entirely removed by Mr. Pratt and his party, leaving the earth piled up on either side marking its former location.

After a careful survey of the group, and having obtained free permission from Mr. G. H. Mosier to open such as were on his land, we decided to first make a thorough exploration of No. 7, a mound of symmetrical outline, and one of the largest in the row. Accordingly, we had our camp outfit hauled up from the river, and pitched our tent hard by on the site of Mound No. 6.

In outline, but for some erosion at the brow of the bluff on the north, Mound No. 7 is almost a perfect circle, with a present diameter of about eighty-five feet, and a height, from summit to floor, of just ten feet; but, as it has been cultivated over for many years, it was probably much higher originally than now, with a diameter proportionately less.

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\*In the report of the former expedition the number is given as twelve, but we could only make out nine at the time of this visit.

Owing to a long-continued drought, the surface earth was very dry and hard, requiring a pick to facilitate its removal, and even after penetrating the crust the digging was by no means easy; but, applying ourselves to the task, we proceeded to open a trench four feet wide by eighteen feet long, extending across the apparent center in a direction approximately north and south. The earth composing the mound is a stiff clay loam, for the most part homogeneous, but with some scattered patches of a purer clay, and a thin layer of the same, of varying thickness, which, about five feet below the surface, appeared plainly, in section, on the hard perpendicular walls of the trench at its northern end. Farther down, the earth became somewhat darker, as of loam with a less admixture of clay, until, at a depth of ten feet, we came upon a perfectly well-defined floor, consisting of a layer of light-yellow, sandy clay, about three inches thick, resting on the original subsoil of compact pure clay.

Thus far, no bones or other deposits had been found, save a mass of rotten wood, the crumbling remains of what were, apparently, decayed oak logs, which, about half way down and just north of the middle of the trench, extended across and beyond it on either side, slanting down toward the south, while just beneath them the clay stratum above mentioned dipped and disappeared.

The fact that in most of the mounds of this group decayed oak wood in considerable quantities is found, was mentioned by Mr. Pratt in his report of the previous expedition.

For convenience in throwing out the earth, about six feet of the south end of the trench was at first but partially excavated, leaving a temporary bench, and we proceeded to run transverse, arched galleries, at the level of the floor, from the excavated part. These galleries were from three to four feet wide and about four feet high, their arched shape, together with the stiffness of their walls, making this method of procedure comparatively safe. Nine galleries in all were dug, besides numerous pockets and connecting passages, laying bare about five hundred square feet of the base. In patches covering much of the floor, to the south of the apparent center of the mound, was a thin layer of a whitish ash, above which were several alternating layers of a darker ash and soft earth, of varying thickness; and just above these again, as seen plainly in section throughout the galleries to the east and south, a continuous layer of rotten wood, as of logs irregularly laid on after the mound had been built up about four feet. This log covering, where present, dipped quite regularly outward, as it would naturally do, following the curvature of the mound. Above

these lower layers, whether wood intervened or not, the superincumbent earth was very compact, there being no appearance whatever of the mound ever having been disturbed.

Such was the structure of the mound in its southern part; but in the northern end of the trench and the galleries radiating from it, neither wood nor ash was found, nor any other evidence of the agency of man (except, perhaps, the distinct clay layer above mentioned), save a continuation of the floor, scattered over which, in greater number here than elsewhere, were occasional small flint chips, raising our hopes of discovery when the spade would strike against them. Throughout the work in this mound, no shells or fragments of shell were seen, excepting the beads hereinafter mentioned, unless, indeed, a layer of what seemed an especially white ash, in contact with the decayed wood, above and below, were burned or decomposed shells instead, as suggested in the description of Mound No. 6 (*Proc.*, Vol. I., p. 107). If of ash, as they probably were, they must have been placed there after burning, since the wood shows no trace of the action of fire. Indeed, save one or two minute bits, no charcoal was anywhere found in the mound. Not a single shard of pottery was seen, nor even a stone of any size, and only a very few pebbles, small and rough, scattered through.

Almost immediately on starting the first gallery west, about midway of the trench and two feet above its floor, we came upon a mass of human bones, consisting of two femurs, a clavicle, and several bones of the left arm, forearm, and hand, all in a heap, and with them a small piece (the only one found) of worked flint. How they came to be there, placed and dissociated as they were, we could not conjecture. There was no appearance of the earth having been disturbed above them, and their state of preservation was much the same as that of the corresponding parts of the entire skeletons afterward found.

Nothing further was discovered until we had tunneled several feet back from the trench, where, following the thin layer of ash—here continuous and quite distinct on the level floor—and just after making a turn to the south, we struck on a so-called copper “awl,” standing upright and firmly embedded in the hard clay base. About two feet beyond this we came upon the first of a rich group of relics, viz: four copper “axes,” so-called; two curved-base pipes—one of calcite, translucent, with cylindrical bowl, and one of catlinite, finely carved in the image of a hawk, with eyes of pearl;\* a large block of mica in loose

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\*A similar bird pipe, with pearls for eyes, was taken from Mound No. 6 in this group by Mr. Pratt's party, in 1875. (*See Proc. Dav. Acad. Nat. Sci.*, Vol. I., p. 108.)

flakes; another awl, and a crushed human skull (the entire skeleton being afterward found in place), from beneath which one of the axes, completely wrapped in a crumbling covering of cloth and bark impregnated with copper carbonate, was taken.

Continuing the excavation, another copper axe was found near the left shoulder of the skeleton, and a large quantity of beads, both of pearl and shell, dull and fragile, in the region of the neck and chest.

Having removed the remaining earth from the trench, another cross-gallery was now started just at its southern end, and in the western branch of this gallery we very soon came upon the body of the skeleton to which the skull before found belonged. It was the skeleton of an adult male, lying extended, face up, with the head to the north-west.

Close by the right side, and with its head on a level with the shoulder of the larger skeleton, was that of a child of perhaps ten years, its lower maxilla showing the rudimentary permanent teeth under some of the milk teeth which were still in their sockets, while the wisdom teeth had not been erupted. Just beyond the child's skeleton was found a third copper awl, and the floor of the mound here rose quite abruptly about ten inches, like the side of a basin, while it sloped considerably under the bodies toward their feet.

As the south abutment at the entrance of the last arch constructed rested directly upon the thighs and knees of the larger skeleton, these parts were, of necessity, left for the time undisturbed, and a gallery was run southward from the end of the trench, where we soon came upon the feet in place, about which and the legs were more shell beads. Below the feet from eighteen to thirty-six inches, and about two feet apart, was a row of three more copper awls, making a total of six of these pins, five of which were upright when found, piercing the floor, above which they projected one or two inches. They are from four to seven inches in length, about one-eighth of an inch through, hammered square, except at the pointed lower end, and turned abruptly over at the top, being similar to those shown in Figs. 1 and 5, Pl. VI., Vol. I., Proc. Dav. Acad. Nat. Sci. The suggestion made by one of our party, that they might have been used to pin down a covering of skins or cloth placed reverently over the bodies of the dead, seems plausible in view of their relation to the skeletons and the floor.

Beyond the feet of the bodies we dug for some distance into the side of the last gallery, till there, also, the floor began to rise, as it had at their right and, less markedly, at some distance above their heads beyond the grouped relics, forming, as it were, part of the rim of a dish

bounding our work toward the south, on whose inner slope the two bodies lay.

Deeming it useless to proceed further in this quarter, we abandoned the southern part of the mound, cutting away the supporting pillars behind us, thus completing the exposure of almost the entire floor of this section, and afterward filling in with the loose earth which had accumulated in the north half of the trench.

The floor at this end being again laid bare, we proceeded as before, tunneling under for eight or ten feet at its sides and end, finding no indications, however, of another burial — finding nothing, indeed, but a continuation of the level floor toward the bluff, which, so far as we followed it, showed no rim-like rise to the north corresponding to that on the opposite side.

As we had devoted most of our available time to this mound, and there were no indications to encourage further research, we decided to quit work here, and replaced the earth in and over the trench, leaving the contour of the mound but little disturbed.

Had the initial trench been extended a few feet further south, and carried down at once at this end, to the floor, we would have come directly upon the skeletons and the relics accompanying them; but a better insight into the structure of the mound and a fuller assurance that nothing of interest was left undiscovered, well repaid the additional toil.

In addition to the work done on Mound No. 7, we made a partial examination of No. 8, situated some two hundred feet further west, and also of a small mound about half a mile south-east of the village. No. 8 is probably the largest of its group. In the early settlement of the region it had been utilized as a building site, a large depression to the south of the center indicating where the cellar had been. Due allowance for the leveling effects of time under the circumstances of its occupancy, leaves for the mound a diameter of one hundred and forty feet and an altitude of eleven.

To the south of the center, partially in the cellar depression, and extending in a north-easterly direction, we opened a trench three and a half feet wide and sixteen feet long. In the trench, at a depth of about nine feet, we came upon the floor, which was simply a layer of yellow clay about a half inch in thickness, resting on black loam, doubtless the original surface soil. Immediately above the clay, also, was the same black loam, the interior of the mound being here moist and sodden by reason of the depressed excavation. In the trench, resting on the floor and covered by loam, we found parts of four skeletons, much

decomposed; but associated with them were no relics of any description. This absence of all deposits other than bones, together with the slight pains which had evidently been taken with the floor, gave the impression that, although the largest in the group, this mound had served for the more ordinary burials, or that perhaps the part we were at work in was simply an addition to an older mound.

With this thought we ran a tunnel eighteen feet long from the northeastern extremity of the trench in a westerly direction toward the highest part of the mound. Here, the layer of clay having disappeared, we started a tunnel due south, being encouraged to hope for greater developments in this direction by reason of a thickening of the floor. In about three feet, however, it again disappeared, and we gave up the work, regretting the want of time which prevented us from exploring other parts of this mound, for we felt that so large a structure might well contain further deposits.

In addition to these two mounds of the principal group, a short time was devoted to exploring one of a group on the other side of the village, back from the brow of the bluff, which had been partially excavated by Mr. Daniel Hindman, a young man residing in the place, some six years before. Work at that time had been suspended because of the interfering roots of a tree which he had not permission to remove, but not before a pipe and part of a skeleton had been found. This mound is about thirty feet in diameter and three feet high. We merely enlarged the old excavation, and in so doing came upon the greater part of a skeleton, and on the same level (we could trace no definite floor), about a foot to the right of the skeleton, we found two earthen vessels, one near the head and the other opposite the middle of the body. Both were turned on their sides and badly crushed, the one near the head being filled with ashes and earth. At a point about a foot above the head, the pick crushed through a large piece of mica, and a chunk of obsidian weighing two pounds was found on a level with the skeleton at, approximately, the center of the mound.

On the morning of Friday, the 30th, it being impossible to remain longer, we struck our tent, reloaded our skiff, and rowed across the Mississippi to New Boston, where, in a few hours, we were fortunate enough to obtain passage for ourselves and boat on the "Pittsburg," upward bound.

E. P. LYNCH.	C. E. HARRISON.
H. C. FULTON.	C. H. PRESTON.

**ADDITIONAL EXPLORATIONS AT TOOLESBORO.**

*Read before the Academy, November 27th, 1886.*

HAVING, by the courtesy of Mrs. E. H. Mallory, of Toolesboro, Louisa County, received permission to explore one of the remaining undisturbed mounds of the group, and which is situated on her land, the undersigned visited that place on the 18th of October for that purpose. We found the mound—No. 5 of that group—situated in a garden where the ground has been cultivated for many years, until the height of the mound has been reduced to an extent which cannot now be determined. Judging from the others of the same group which have not been so changed in proportions, it must probably have been from eight to ten feet high.

Securing some laborers to assist in the work, we began by opening a trench, about five by eighteen feet, near the south side of the mound, and running east and west. The soil of which it was composed was a mixed earth such as is usually met with, very hard, and containing here and there minute bits of charcoal. At the depth of four feet four inches, we came upon an evenly spread layer of quite clean yellow clay, from half an inch to an inch in thickness. This was evidently an artificial deposit placed upon the surface after removing the soil, which in that locality is very thin, and is slightly below the level of the surrounding surface of the field. We dug down below it in several places, but found only the natural, undisturbed earth.

Finding no human remains or relics thus far, we cut down another five feet in width along the north side of the excavation already mentioned. In this, about half-way down, we found a small rough chert knife or scraper. In this cut, at the bottom, at the west end, were a few human bones, not very well preserved; from which, however, we secured one skull in tolerably good condition, and the frontal bone of another of remarkably low, flat, brutal form. With these bones was the shell of a turtle, broken into many and small pieces, showing, however, that it had been sculptured to some extent, though it was in so small fragments that the design of the cuttings could not be made out. This excavation was extended farther west and south, entirely beyond all indications of remains of any kind. At the bottom of this excavation, and about at the middle of the mound, we found a very finely carved, smooth and symmetrical curved-base pipe, with plain, round

bowl, made of gray pipestone. There were no bones or other remains near it.

We next cut down another slice along the north side of the former, five or six feet wide and about twenty-five feet in length. In this we went to the clay layer at bottom without making any discoveries whatever. At the east end, however, we found that the said layer of clay stopped at a sharp line running diagonally across. Digging down into the space not covered with the clay, we found that a "grave" or excavation had been dug there to the depth of twenty inches, when we again came down to the natural, undisturbed clay. At the bottom of this, lying along the south-west side of the pit, and with the head to the north-west, was a very much decayed adult skeleton, and mixed up with the bones of the trunk were a few of the bones of a child.

In order to uncover this pit entirely, we made a still further cut northward, thus exposing, in all, some twenty-five feet square of the floor of the mound. On removing the earth entirely from this deeper burial-place, we found another skeleton lying at right angles with the first, along the north-west side of the pit, and were greatly disappointed at finding associated with the bones in this portion, which seemed to have been prepared with especial care, no relics of any kind whatever. This pit was of irregular form, measuring eight feet along the south-west side, seven feet on the north-west, and the other sides six and five feet respectively.

This mound, though nearly of the same size of the others of the same group, is remarkable for the entire absence of copper relics, beads, marine shells, pottery, mica, obsidian, galena, and flint, bone, and horn implements (except the scraper above mentioned).

Mr. G. H. Mosier and Mr. Hannibal Parsons were very kind and courteous, and both gave us full privilege to explore any mounds we might find on their property. We opened one supposed mound on the land of each, but finding no encouragement or indications of relics or of work of human hands, abandoned them.

C. E. HARRISON.

W. H. PRATT.

## CONTRIBUTIONS TO THE MOLLUSCA OF FLORIDA.

BY CHARLES T. SIMPSON.

*Read before the Academy, December 31st, 1886.*

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### INTRODUCTORY.

THE following pages are chiefly the result of the collections made during a four years' residence near Braidentown, on the west coast of Florida. No pretensions are made to its being a complete list, as it comprises, for the most part, only such species as were collected by the author, and those received from reliable collectors from within the limits of the State. It was my intention, while residing in Florida, to at some time publish a complete catalogue of all the species of mollusca belonging to the State, and, with that intention in view, I had planned an extensive cruise last winter down the west coast, up the Caloosahatchee to Lake Okeechobee, the South-eastern Keys, and up along the east coast of the mainland; but unforeseen circumstances compelled me to leave the State, and completely changed my plans. This fact, the lack of literature on the subject, the terrible confusion that exists in the nomenclature and synonymy of Floridan and West Indian shells, together with the fact that there are but few resident conchologists in the State, and that but little material can be obtained unless by actually collecting it, have led me to abandon the project and to substitute, instead, a catalogue of my own collections, with notes and observations made while actually in the field.

In the listing of these shells I have been particularly careful as to locality, knowing that our knowledge of geographical distribution depends wholly upon the accuracy of collectors in this direction. An excellent memory in this respect, the careful labeling of specimens, and notes taken while collecting, have rendered the statements of locality given tolerably accurate.

Where shells were found more or less throughout a wide area, I have often marked them "West Coast," meaning that they were found at many points along the west coast of the State; or, "Florida Keys," alluding to species common to the lower chain of Keys, and not to those of the western coast.

With regard to the distribution of the mollusca of Florida, my experience has given the following results:

First — On the west coast the marine shells consist of a number of Atlantic coast forms, a few species peculiar to the south-east coast of the United States, and a very large number of West Indian shells. From the vicinity of Tampa Bay to the extreme point of Cape Sable, I found but little change in the species. Such shells as *Strombus pugilis*, the *Fulgurs*, *Pyrula papyracea*, the *Fasciolarias*, *Melongena corona*, *Natica duplicata*, *Oliva literata*, *Nassa vibex*, *Littorina angulifera* and *irrorata*, and *Crepidula fornicata*, among the Gasteropods, and *Ostrea virginica*, *Venus mortoni*, *Loripes edentula*, *Mactra similis*, *Donax variabilis*, *Cytherea gigantea*, *Cardium magnum*, several species of *Mytilus* and *Modiola*, and the *Pinnas seminuda* and *muricata*, among bivalves, are characteristic of the west coast throughout the region which I have indicated. A few West Indian species become more plentiful as we go southward; thus, *Cancellaria reticulata* is somewhat rare in the vicinity of Tampa Bay, but is plentiful on Sannibel Island, a hundred miles south, and so on to the extreme end of the State. *Tellina puniceus* is very seldom found north of the Caloosahatchee River, but at Cape Sable it is abundant; *Natica canrena* is more abundant to the southward, etc. Still, the difference in a collection of shells made at Anna Maria Key and one from Cape Sable is hardly perceptible. But when one crosses over to the nearest of the lower range of Keys a very different shell fauna is met with. On these Keys the characteristic species are such shells as *Vasum muricatum*, *Strombus gigas* and *bituberculatus*, the *Tritons*, *Ricinula nodulosa*, the *Purples*, *Marginella carnea* and *guttata*, *Ovulum gibbosum*, *Columbella mercatoria*, the *Cypræas*, the *Doliums*, the *Neritas*, the violet snails, several species of *Littorina*, the *Imperators*, a number of *Acmaeas*, the *Strigillas*, *Mytilus exustus*, the *Pernas*, and the like, *scarcely one of which is ever found on the west coast of the mainland at all*.

This change may be accounted for in part, no doubt, by the fact that the Keys are of coral formation and that the shores of the west coast of the mainland are mostly sandy; but I believe the Gulf Stream to be accountable for most of this. It sweeps to the southward a long way to the west of the mainland of Florida, but is crowded in close to the Tortugas and the Florida Keys, and is kept in near to these Keys on the south-eastern shore and for a long distance up the east coast of the mainland. The theory that this is the distributor of many of these tropical forms is sustained by the fact that such shells as *Purpura floridana*, *Strombus bituberculatus*, *Marginella carnea*, *Cassis tuberosa* and

cameo, the *Dolium*s, galea and *perdix*, the *Ianthinas*, *Arca incongrua*, *Pecten ornatus*, and many others, are found along the entire eastern coast of the State, and even, in some cases, as far north as the coast of North Carolina, though not one of them, so far as I know, is found on the west coast. The molluscan fauna of the Bermudas, though these islands lie north of the northern limit of Florida, is much more like that of the lower Keys than that of the west coast.

Another point worthy of notice is that many of the Atlantic coast species appear on the west coast of the State, some of which, though abundant at Tampa Bay and northward, are not found, or are rare, at the southern extremity of the peninsula. Among the Atlantic coast species found on the western shore of the State, I may mention *Urosalpinx cinerea*, *Eupleura caudata*, *Columbella avara*, *Natica duplicata*, *Crepidula glauca*, *forficata*, and *convexa*, *Bittium nigrum*, *Littorina irrorata*, *Macra lateralis*, *Crassatella lunulata*, *Macoma proxima*, *Ostrea virginica*, etc. Some of these extend westward to the coast of Texas. I have seen a number of these in the collection of Mr. Harry A. Pilsbry, picked up by him at Galveston, and among them valves of *Petricola pholadiformis*, a shell which I have never found on the west coast of Florida. It is reported from that locality by Mr. Calkins, but I have seen the shells presented by that gentleman to the Davenport Academy and bearing that label, and they are only worn valves of *Pholas costata*. Whether or not these species passed into the Gulf of Mexico before the peninsula attained its present dimensions, as has been surmised, is a question I think we cannot settle until we know more of the distribution of living forms and of the fossil species of the State.

I found the Tortugas wonderfully rich in the smaller forms of the mollusca, and many species were obtained there which I think have never heretofore been credited to Florida. Sarasota Bay and vicinity and Tampa Bay were also very prolific in species. A single dredging trip of some twenty hauls, in the latter body of water, yielded about one hundred and twenty-five species, many of them never obtained elsewhere.

Second — The land shells of the State consist of a few species of wide distribution, such as *Zonites indentatus*, *arboreus*, *minusculus*, and *fulvus*, *Strobila labyrinthica*, several of the *Pupas*, *Carychium exiguum*, *Succinea obliqua*, and the like; a number that are peculiarly southern in their distribution, among which the *Polygyras* are numerous, both as to species and individuals, and a good many species whose metropolis is the West Indies and South America, probably brought

by the Gulf Stream. Among these may be mentioned *Zonites gundlachi*, *Cylindrella poeyana*, *Bulimulus marielinus*, *Strophia incana*, *Stenogyra subula* and *gracilima*, *Liguus fasciatus*, *Orthalicus undatus*, the two species of *Macroceramus*, from Cuba; *Helix varians*, from the Bahamas; and *Bulimulus multilineatus*, from South America. *Glandina truncata* is also a Cuban species, as well as *Helix vortex* and *Chondropoma dentatum*. Of the West Indian shells, *Strophia incana*, *Bulimulus marielinus*, the *Stenogyras*, *Helix varians*, *Orthalicus undatus*, the *Cylindrellas*, and *Chondropoma dentatum* seem to be confined to the lower Keys or the extreme southern portion of the peninsula; *Bulimulus multilineatus* and *Liguus fasciatus* range farther north; the two species of *Macroceramus* extend to Tampa Bay; and the remainder are probably found over the greater part of the State. Of course these limits may be extended by future research.

Third — The fresh-water species have but a small representation from the tropics. *Planorbis tumidus* is a Cuban shell; so are *Ampullaria depressa* and *Neritina reclinata*. *Ancylus obscurus* is West Indian, and *Ampullaria caliginosa* is from Mexico and Nicaragua. A number of the univalves are of northern origin, no doubt: such as *Limnæa humilis*, *Planorbis trivolvus*, *Physa heterostropha*, and the like. The species of *Unios* are all, so far as I know, confined to the waters flowing into the Atlantic and Gulf of Mexico, and many of them are probably peculiar to the State.

In the preparation of this catalogue, I have been continually under obligation to Mr. William H. Dall, of the United States National Museum, at Washington. He has identified several hundreds of the smaller and less known species, has aided me constantly with advice and valuable suggestions, and has written out the descriptions of the new species. To him my thanks are due for his patience and forbearance throughout. Mr. Dall wishes me to say that he has simply given a name to such species as have passed through his hands; that it would be impossible to tell whether these names will stand or not when the synonymy is thoroughly worked out.

I would also express my obligations to Mr. John Ford, of the Philadelphia Academy of Natural Sciences, for comparing many of my species with the type-shells in the museum, and for kindly help and encouragement; to M. C. F. Ancey, of Marseilles, France, for identifying many of the land species and fresh-water univalves; to Mr. William A. Marsh, of Aledo, Ill., and Mr. Harry A. Pilsbry, of Davenport, Iowa, for assistance in identifying the *Unios*.

I have no doubt that there are errors in this catalogue. It has been prepared in haste, in the odd moments of a very busy life. I have but little literature on the subject, and have never had any opportunity to examine extensive libraries or collections;—in fact, a portion of my Florida species I have not yet had time to unpack and compare. My work has been mostly done in the field. I thought it better, however, to do something than to wait for leisure and opportunities which might never come. I therefore ask the kindly consideration of all into whose hands it may fall.

OGALLALA, NEB., December 1, 1886.

### CATALOGUE.

[In the following catalogue, such species as have been obtained only from other collectors are designated by an asterisk (\*). All others have been collected by myself.]

*Octopus vulgaris* L. Washed up on Long Key.

*Octopus rugosus* Bosc.? Florida Keys.

*Ommatostrephes*? A specimen washed up on Long Key, the pen of which is referred by Mr. Dall to this genus with doubt. The animal was partly decayed when found.

*Spirula peronii* Lam. Florida Keys; not rare.

*Hyalea trispinosa* D'Orb. One shell found washed up on the lower end of Anna Maria Key.

*Murex pomum* Gm. West coast. Very abundant at Sanibel Island and southward.

\**Murex adustus* Lam. A single fine specimen was received from Mr. Isaiah Greigor, of Jacksonville, who reports it from the east coast. Tryon gives its locality as Indian Ocean, Phillipines, and Japan; but Dall, in his catalogue of West Indian shells, reports it from Cuba, on the authority of Pfeiffer.

*Murex recurvirostris* Brod. Anna Maria Key, one specimen; Sanibel Island; Marco, and vicinity.

*Murex brevifrons* Lam. Two slightly worn specimens, found at Key West, are referred to this species.

*Murex chrysostomus* Gray. One young shell from Sanibel Island. I have seen a fine full-grown shell, belonging to Mr. R. C. Stuart, of Tampa, found on the west coast, which is probably this species.

*Murex salleanus* A. Ad. West coast; more abundant at Sanibel Island and southward.

*Murex nuceus* Mörch. Tampa Bay; Tortugas. A number of specimens were dredged, living, in eight fathoms of water, in Tampa Bay.

*Murex intermedius* C. B. Ad. Worn specimens were found at Key West. I have this shell from the Bermudas and Honduras, east coast.

*Murex cellulosa* Con.? Dredged in Tampa Bay. Agrees better with Conrad's description of this species than with anything else.

*Muricidea hemphilli* Dall. Long Key to Sannibel Island. Quite variable in sculpture and coloring. I have a bright orange-colored shell.

*Muricidea floridana* Con. Abundant at Tampa Bay and vicinity.

*Urosalpinx cinereus* Say. Occasionally found in the vicinity of Tampa Bay.

*Urosalpinx cinereus* Say, var. A couple of heavy-shouldered shells, with short spire, somewhat worn, were picked up on Sannibel Island. Mr. Dall supposes them to be a variety of this species.

*Urosalpinx tampaensis* Con. Occasionally found in Tampa Bay.

*Eupleura caudata* Say. Dredged in Tampa Bay.

*Eupleura muriciformis* Brod. Anna Maria Key. A heavy, white shell, very different from *E. caudata* as dredged by me; but Mr. Dall believes it to be the same.

*Purpura hamastoma* L. Key West.

*Purpura floridana* Con. Florida Keys; east coast, Mr. T. L. Cunningham.

*Purpura undata* Lam. Florida Keys. Both this and the preceding are, no doubt, forms of the widely distributed and variable *Purpura hamastoma*.

*Purpura deltoidea* Lam. Florida Keys.

*Ricinus nodulosa* C. B. Ad. Key West; Tortugas. Abundant.

*Rhizocheilus (Coralliophila) galea* Chem. Tortugas, one worn shell. Two worn shells were found in Tampa Bay, which are probably this, but are more slender and not so solid as the Tortugas specimen.

*Triton tritonis* L., var. *nobilis* Con. I found about thirty living specimens on the reefs at Tortugas, of an apparently stunted form, being very solid and having a heavy lip, though not over seven or eight inches in length. Capt. William Bahrt, of Braidenton, has a noble shell from Duck Key that measures fourteen inches in length.

*Triton pilearis* L. Tortugas. This is Calkins' *T. veliei*.

*Triton chlorostomus* Lam. Tortugas. One fairly good adult shell.

*Triton femorale* L. Four fine living shells were obtained at Key West; they are not so large or bright as shells from the West Indies.

*Triton tuberosus* Lam. One shell found at Tortugas.

*Triton lamellosus* Dkr. Key West.

*Triton lanceolatus* Mke. Anna Maria Key, one fine shell; worn shells were picked up at Key West.

*Triton eximius* Reeve. Key West; Tortugas.

*Triton arachnoides* Mörch. Tortugas; several worn and broken examples.

*Fasciolaria tulipa* L. Common and variable. A form found in sheltered bays is much duller colored and coarser than those of the open sea. A mahogany-colored form is occasionally found on the Keys.

*Fasciolaria distans* Lam. West coast; common. Mr. Tryon makes this a variety of *F. tulipa*. I have never found the connecting shells.

*Fasciolaria gigantea* Keiner. West coast, and Keys. In the vicinity of Tampa Bay, adult shells are seldom over a foot long. On the Keys, I have seen dead shells two feet in length. The largest Gasteropod in the world.

*Latirus infundibulum* Gm. Tortugas.

*Latirus cayohuesonicus* Sow. Jr. Tortugas.

*Leucozonia cingulifera* Lam. West coast, rare; more common on the Keys.

*Melongena corona* Gm. West coast, and Keys. Very common and variable. A small form, described by Sowerby in Proc. Zoöl. Soc., London, is common on the Keys and southern end of the mainland.

*Melongena corona*, var. *bispinosa* Phil. Abundant at Lostman's Point.

*Fulgur pyrum* Dillw. West coast.

*Fulgur perversus* L. West coast; common. The shell is ordinarily painted, when young, with brown, buff, and orange; but fades into a dirty white when full grown. I have a live shell, found at Long Key, which measures fifteen and one-half inches in length. On this island I found a beautiful, pure white variety, young shells sometimes having a few black markings on the spire. Both species are found at Galveston, on the Texas coast.

*Cantharus tinctoria* Con. West coast, rare; common on the Florida Keys.

*Cantharus tinctoria*, var. *antillarum* Dkr. Key West; Red-fish Point; Tampa Bay.

*Cantharus coromandelianus* Lam. Florida Keys.

*Cantharus parvum* Ad. Tortugas.

\**Cantharus cancellaria* Con. Cedar Keys.

\**Phos intricatus* Dall. Key West. Received from Mr. Wm. H. Dall.

*Nassa vibex* Say. West coast; common.

*Nassa ambigua* Mont. West coast, rare; Florida Keys, common.

*Nassa ambigua*, var. *consensa* Rav. Dredged; Tampa Bay.

*Nassa ambigua*, var. *acuta* Pult. Dredged; Tampa Bay.

\**Nassa obsoleta* Say. Fernandina, Mr. Henry Hemphill; east coast, Cunningham.

*Vasum muricatum* Born. Little Content Key; Key West.

*Voluta junonia* Chem. West coast. Rarely found in good condition, it being a deep-water shell. I have a specimen, in fairly good condition, from Little Sarasota Pass.

*Mitra barbadensis* Gm. Key West; Tortugas reefs. Several very large and fine specimens were found at the latter locality, under coral rocks, at low tide.

*Mitra hanleyi* Dohrn. Tortugas.

- Mitra albocincta* C. B. Ad. Tortugas.  
*Mitra sulcata* Gm. Tortugas.  
*Mitra floridana* Dall. Tortugas.  
*Erato manguerie* Gray. Tampa Bay; west coast. Rare.  
*Marginella carnea* Storer. Key West.  
*Marginella guttata* Dillw. Key West.  
*Marginella apicina* Mke. West coast.  
*Marginella apicina*, white var. Key West.  
*Marginella opalina* Stearns. Magill's Bay.  
*Marginella aureocincta* Stearns. One specimen was found in Sarasota Bay.  
*Marginella pellucida* Pfr. Sarasota Bay; Key West; abundant at the Bahamas.  
*Marginella roscida* Red. West coast. I am doubtful whether this is distinct from *apicina*.  
*Marginella nitida* Hds. Magill's Bay. One shell was found at Key West.  
*Marginella paxillus* Reeve. Sarasota Bay.  
*Marginella catenata* Mont. Tortugas; abundant.  
*Marginella ovuliformis* D'Orb. Red-fish Point; Tampa Bay.  
*Marginella minuta* Pfr. Tampa Bay.  
*Marginella lachrymula* Gld. Tampa Bay.  
*Marginella lactea* Keiner. Key West; Tortugas.  
*Marginella pallida* L. Tortugas.  
*Marginella nivea* C. B. Ad. Tortugas.  
*Olivella mutica* Say. West coast. Quite variable.  
*Olivella mutica* Say, var. A small, yellowish variety, marked with zigzag, brown lines, was dredged in Tampa Bay.  
*Olivella mutica* Say, var. *nitidula* Dillw. West coast.  
*Olivella nivea* Gm. Sarasota Pass.  
*Olivella jaspidea* Gm. Tortugas.  
*Olivella floralia* Duc. West coast.  
*Oliva literata* Lam. Very abundant throughout the west coast, on sand flats, at low tide, and extends west to Texas.  
*Oliva literata*, var. A golden yellow variety, which is almost entirely devoid of markings, is rarely found on the west coast.  
*Oliva reticularis* Lam. Key West.  
*Columbella mercatoria* L. The Keys; east coast, Cunningham. One living specimen was dredged in Tampa Bay, in seven fathoms. A most variable shell in size, form, and coloring.  
*Columbella dysoni* Reeve. Tortugas. A shell agreeing with Tryon's figure and description of this was found on Tortugas, and I have the

same from Utilia, Honduras. I have no doubt that it is a form of *C. mercatoria*.

*Columbella rustica* L. Magill's Bay, large and fine; mouth of Caloosahatchie River.

*Columbella nitida* Lam. Tortugas reefs. Abundant under rocks at low tide.

*Columbella cribraria* Lam. Tortugas.

*Columbella lunata* Say. Egmont Key; Red-fish Point; Manatee River.

*Columbella pulchella* Keiner. Garden Key; Tortugas.

*Columbella acuta* Stearns. Egmont Key.

*Columbella avara* Say, var. *simplicata* Stearns. Manatee River, on floating dry-docks; dredged in Tampa Bay.

*Columbella obesa* C. B. Ad. Red-fish Point, dead shells.

*Columbella ostreicola* E. A. Smith. Tampa Bay; Cedar Keys, Mr. J. B. Upson.

*Columbella stearnsi* Tryon. Tampa Bay.

*Columbella hotessieri* D'Orb. Tampa Bay. Worn shells were dredged, which are probably this species.

*Engina turbinella* Kiener. Tortugas reefs, under stones; Key West.

*Cancellaria reticulata* Dillw. West coast; more abundant at Sannibel Island and southward.

*Cancellaria stimpsoni* Calkins. A single shell was picked up in good condition on Cape Sable.

*Terebra protexta* Con. West coast, rare; dredged in Sarasota and Tampa Bays.

*Terebra dislocatus* Say. Abundant on sand flats at low tide.

*Strombus pugilis* L. Common everywhere on the west coast. A color variety has the interior of the mouth colored violet and blue.

*Strombus pugilis*, var. *alatus* Gm. Not a distinct variety at all. I have a suite of shells, varying from perfectly smooth forms to those with sharp spines on the shoulder, and from a uniform chestnut color throughout all the different patterns of bands and zigzag painting to pale yellow. Some of the smooth forms are a uniform chestnut color. I have a tuberculate variety with a brilliant light orange aperture. All these forms are found from high tide to several fathoms' depth.

*Strombus bituberculatus* Lam. Florida Keys; east coast.

*Strombus gigas* L. Florida Keys.

*Strombus costatus* Gm. Florida Keys; rare. I have a weathered shell which I found on Passage Key, at the mouth of Tampa Bay, and Mr. Charles More has one, in good condition, which he found on Egmont Key, while residing there as light keeper. I have a young shell which is probably this, which Mr. P. W. Reasoner found at Little Sarasota Pass, that is of a bright crimson color. I have seen shells of this species that were collected near St. Augustine.

*Cypræa exanthema* L. Tortugas reefs; Key West.

*Cypræa cervus* L. Tortugas reefs; young. I have a fine pair which are almost black, from Key West. One very large dead shell was found at Stump Pass, by Mr. James Mann.

*Cypræa spurca* L. Tortugas reefs; living.

*Cypræa cinerea* Gm. Several dead shells and one very fine living specimen were found at Tortugas reefs.

*Cypræa (Trivia) pediculus* L. Anna Maria Key; Florida Keys.

*Cypræa (Trivia) quadripunctata* Gray. Tortugas; very plentiful.

*Cypræa (Trivia) nivea* Gray. Tortugas; one shell.

*Ovulum gibbosum* L. Key West.

*Ovulum acicularis* Lam. Tortugas.

\**Ovulum uniplicata* Sowb. R. C. Stuart, found on the Florida Keys.

*Cassia cameo* Stimpson. Tortugas; rare. This fine species, once abundant at the above locality, is now seldom found, and I was told that a specimen had not been obtained there, in good condition, for more than a year. I have seen shells from the Tortugas that would not go into an ordinary water-bucket. I found a nearly entire fresh shell on the upper end of Anna Maria Key, in the spring of 1885.

*Cassia sulcosa* Brug. West coast.

*Cassia sulcosa*, var. *inflata* Shaw. Florida Keys.

*Oniscia oniscus* L. Key West; Tortugas.

*Dolium galea* L. Marquesas Keys, young; Key West.

*Dolium perdix* L. Tortugas; young.

*Pyrula papyracea* Say. West coast; abundant.

*Pleurotoma zebra* Lam. Key West.

*Pleurotoma solida* C. B. Ad. Tortugas; young.

*Pleurotoma tayloriana* Reeve. Sannibel Island.

*Pleurotoma gibbosa* Born. Anna Maria Key; one slightly worn shell.

*Pleurotoma eritima* Bush. Tortugas.

*Pleurotoma atrostyla* Dall. Tortugas.

*Pleurotoma albinodata* Reeve. Tortugas.

*Pleurotoma cerinella* Dall. Tortugas.

*Pleurotoma limonitella* Dall. Tortugas; Sarasota Bay.

*Pleurotoma ostrearum* Stearns. Tortugas.

*Pleurotoma ostrearum* Stearns, color var. Tortugas.

*Pleurotoma biconica* Ad. Tortugas.

*Pleurotoma biconica* Ad., var. Tortugas.

*Pleurotoma caribbea* D'Orb. Tortugas.

***Pleurotoma (Mangilia?) Simpsoni*, n. s.**

The following is Mr. Dall's description of this little shell:

"Shell polished, shining, with (including the nucleus) six and a half whorls; nucleus madder-brown, smooth, rather large, blunt, with one and a half turns; remainder transversely ribbed with 8-10 smooth, rounded, nearly straight, stout ribs, extending from suture to suture, which begin with the end of the nuclear part, and fail at the last third of the last whorl, which is marked only by silky fine incremental striæ; the spaces between the ribs are equal to or somewhat less than the ribs in width; longitudinal sculpture none, or only occasional extremely faint microscopic lines; whorls not inflated; color, rosy pellucid white, banded in front of the suture with rosy brown, fainter on the ribs, and, in the specimen described, extending forward nearly to the periphery of the earlier whorls; the base of the last whorl similarly tinged; the last somewhat varicose rib and the outer thickened lip whitish; aperture and canal very short and wide, and notch deep and large, rounded, leaving no fasciole, the outer lip lightly thickened, arched forward, a slight callus on the columella; interior not lirate in the specimen described.

"Lon. 5.75 mm.; last whorl equal to half the total length; maximum diameter of shell, 2.1 mm.

"Two specimens of this extremely pretty little shell were obtained at Tampa Bay by Mr. Simpson. It differs from any known form from that region heretofore, and in the form of its aperture and notch recalls some of the west coast Drillias, but, owing to the absence of a fasciole in front of the suture, can hardly be referred to that section of the Pleurotomidæ. One specimen is in the collection of the National Museum, No. 61,040."

The only two specimens obtained of this species were dredged in about five fathoms.

*Pleurotoma monilifera* Sby. Tortugas.

*Pleurotoma auberiana* D'Orb.? Tortugas.

*Pleurotoma nigerrima* Dall. Tortugas.

*Pleurotoma thea* Dall. Sarasota Bay.

*Pleurotoma fuscescens* Gray. Sannibel Island.

*Pleurotoma leucocyma* Dall. Key West.

*Pleurotoma flavescens* Reeve. Tortugas.

*Pleurotoma quadrata* Reeve. Tortugas.

*Mangilia stellata* Stearns. Long Key.

*Mangilia balteata* Reeve. Tortugas.

*Mangilia balteata*, var. Tortugas.

\**Clathurella jewettii* C. B. Ad. Cedar Keys, Hemphill.

\**Clathurella jewettii* Stearns. Cedar Keys, Hemphill.

The Pleurotomidæ are in great confusion, and but little is accurately known concerning the species. I have used the generic name *Pleurotoma* for the species sometimes classed under the generic name of *Drillia*.

*Conus floridanus* Gabb. Cape Sable and northward.

*Conus peali* Green? Shells collected at Long Key seem to agree tolerably well with description and figures of the above, but are larger than the dimensions given for that species.

*Conus proteus* Hwass. West coast. Often washed on shore, but generally worn. Probably a deep-water species.

*Conus mus* Hwass. A number of very fine living shells were collected on the Tortugas reefs at low water.

*Conus pygmaeus* Reeve. West coast. Nearly jet black shells, with white squarish spots, were found in Magill's Bay. Further south, the shell is often whitish, with yellow or brown spots, and grooved throughout the entire body-whorl. I have the same shell collected on the east coast of Honduras, which is very dark and covered with pustules. I also have it from Panama.

*Conus cardinalis* Hwass. A single slightly worn shell was found at the Tortugas which seems to be this species.

*Conus magellanicus* Hwass. Tortugas. Worn shells were found at the above locality which appear to be this. The species is found at the Bahamas.

*Natica pusilla* Say. Young living specimens were dredged in Tampa and Terracina Bays.

*Natica duplicata* Say. Abundant on west coast, being found from the open sea up to nearly fresh water in rivers, and quite variable. There is a flattened form found in the open sea which approaches *N. josephine* in shape.

*Natica canrena* L. West coast; more abundant southward.

*Natica uberiana* D'Orb. Tortugas; Key West; Florida Keys.

*Natica mamillaris* Lam. Tortugas; one worn shell.

*Natica marochiensis* Gm., var. *livida* Pfr. Marco; one fine shell. Occasionally found on the south-west coast.

*Sigaretus perspectivus* Say. West coast, on sand flats at low tide.

*Sigaretus maculatus* Say. Long Key; one shell in fairly good condition.

*Lamellaria pellucida* Verrill. Long Key; one shell.

*Calyptrea candiana* D'Orb. West coast; Long Key. One living specimen and an abundance of dead shells were dredged in Tampa Bay.

*Cochliolepis parasiticus* Stimpson. Passage Key; dredged in Tampa Bay. A few shells, all dead.

*Crepidula fornicata* Say. One of the most abundant shells in the vicinity of Tampa Bay.

*Crepidula glauca* Say. Mr. Tryon makes a species of this, but I have no doubt that it is a variety of the very variable *C. fornicata*.

*Crepidula convexa* Say. I have shells from Tampa Bay and vicinity that agree perfectly with figures and description of this species, as well as with shells from the New England coast. I have often found it

growing on *Modulus floridanus*. I believe it to be a variety of *C. fornicata*.

*Crepidula plana* Say. Common on the interior of the *Fulgurs* and other dead shells.

*Crepidula aculeata* Gm. West coast and Keys. Quite variable; generally found beach worn.

*Capulus intortus* Lam. Key West.

*Capulus subrufus* Lam. Tortugas.

*Mitrolaria equestris* L. Tortugas.

*Mitrolaria equestris*, var. *tortilis* Reeve. Key West.

\**Xenophora conchyliophora* Born. South-east Keys; two living shells were received from William Bahrt.

*Vermetus nigricans* Dall. Sarasota Bay and other localities on the west coast, forming solid reefs between tides. In the crevices among these reefs numbers of *Mytilus exustus* and *cubitus*, and the various species of *Lithodomus* find a home.

*Vermetus conicus* Dillw. Egmont and Anna Maria Keys.

*Vermetus lumbricalis* L., var. *spiratus* Phil. Common on the west coast.

*Vermetus lumbricalis* L., var. *bicarinatus* Mörch. West coast; Cape Sable.

*Vermetus lumbricalis* L., var. *radicula* Stimp. West coast; common.

*Vermetus retifera* Mörch. Tortugas. A peculiar form, having the tube flattened and closely coiled, growing on corals and the piling of an old wharf, and having the apertural portion elevated. Mr. Tryon considered it a variety of *V. conicus* Dillw., but it seems to me quite distinct.

*Vermetus annulatus* Daudin. Tortugas. Partly imbedded in shells of *Chama macrophylla*.

*Vermetus annulatus* Daudin, var. *irregularis* D'Orb. Tortugas. On shells and corals, growing in dense clusters. This agrees in color and in being irregularly contorted, and transversely lamellated, with the description of this variety, but differs from it, and from the description of the subgenus in not being imbedded, and in growing in dense clusters. It is a *Spiroglyphus*, as the operculum is convex externally, with concentric laminae, and concave internally, with a central mamilla and narrowly elevated margin.

*Vermetus decussatus* Gm. Egmont Key.

*Vermetus nebulosus* Dillw.? Tortugas. Attached to shells. On account of the irregular growth of these shells, and the fact that specimens with the opercula are seldom obtained, they are very difficult to accurately identify, and a good deal of confusion exists concerning the species. Many of them closely resemble the shells of *Serpula*, an annelid genus; they differ from the *Serpula* in having a spiral, nuclear shell, and usually internal lamellæ or septa.

*Scalaria tenuis* Sby. Tortugas.

*Scalaria angulata* Say. Tortugas; west coast

*Scalaria humphreysii* Keiner. Tortugas.

*Scalaria eburnea* Pot. and Mich. Tortugas.

*Scalaria krebsii* Mörch. Tortugas.

*Scalaria candeana* D'Orb. Tortugas.

*Scalaria coronata* Lam. Anna Maria Key.

*Scalaria fragilis* Hanley. Key West.

*Scalaria hotessieriana* D'Orb. Tortugas.

*Scalaria blandi* Mörch. Tortugas.

*Ianthina fragilis* Lam. Florida Keys; Key West. Has been picked up on Egmont Key by Mr. Charles Moore.

*Ianthina globosa* Swain. Key West. On a certain Sunday morning, while at Key West, I found the beach strewn with millions of *Ianthina fragilis* and *globosa*, the former being most abundant. Thousands of these shells contained the animals in a perfectly fresh state, and were no doubt living when thrown up the night before. There had been no storm, nor even a change of wind, and though I had searched the same beach the evening before, I had not found an example of either species. It seems as if a vast school of these animals, carried by some current, had been landed bodily on the rocky beach.

*Cæcum* sp. ind. Tortugas.

*Cæcum pulchellum* Stimp. Tortugas.

*Cæcum floridanum* Stimp.? Anna Maria Key.

*Eulima conoidea* Kurtz and Stimp. Dredged in Tampa Bay.

\**Eulima psila* Wat. Obtained of Mr. Isaiah Greegor, and said to come from the east coast of Florida.

*Niso aeglees* Bush. Tampa Bay; dredged.

*Turbonilla interrupta* Tott. Tampa Bay; dredged.

*Turbonilla arcolata* Verrill? Tampa Bay.

*Turbonilla gracilis* Dek. Tampa Bay.

*Odostomia granatina* Dall. Dredged in Tampa Bay.

*Odostomia impressa* Say. Cedar Keys; J. B. Upson, Tampa Bay.

*Oscilla nivea* Mörch. Tortugas.

*Pyramidella dolobrata* Lam. Little Sarasota Pass. A single fresh shell was found at the above locality. I found it abundantly fossil in the hammocks south of Manatee, in company with *Bulla striata*, the latter now found only rarely living on the Florida Keys. With these fossils were associated a great majority of the species living to-day on the adjoining coast. I believe that *Pyramidella dolobrata* has not before been reported from Florida, though it is abundant in the Antilles.

*Obeliscus crenulatus* Holmes. Dredged in Tampa Bay.

*Obeliscus candidus* Mörch. Dredged with the typical *tessellatus*.

*Littorina angulifera* Lam. Abundant on the west coast and Keys to Honduras and throughout the West Indies, Bahamas, and Bermudas, often climbing twenty-five feet up mangrove trees. Exceedingly variable in size and coloring. The finest specimens were found at Marco.

*Littorina irrorata* Say. Abundant in localities only rarely covered by high tide.

*Littorina lineata* D'Orb. Florida Keys; a very large, heavy, inflated form was found at Key West.

*Littorina zigzag* Chem. Key West; Tortugas. Quite variable; some shells nearly jet black and smooth, others with rounded whorls approach very close to *L. lineata*, with which it probably connects.

*Littorina guttata* Phil. One shell found at the Tortugas, and another at Uilla, Honduras. Mr. Dall identifies them as his species.

*Echinella nodulosa* Pfr. Florida Keys.

*Tectarius muricatus* Lam. Florida Keys.

*Modulus floridanus* Con. West coast.

*Modulus lenticularis* Chem. Common on the Keys; west coast, rare.

*Modulus modulus* L. Tortugas.

*Planaxis nucleus* Wood. Tortugas.

*Planaxis lineatus* Da Costa. Tortugas.

*Litiopa bombyx* Kiener. Washed up on Tortugas; very abundant on floating seaweed in the Caribbean Sea.

*Alaba tervaricosa* Ad. Tortugas.

*Cerithium atratum* Born. West coast; abundant. East coast; received from Cunningham.

*Cerithium eburneum* Brug. Florida Keys. Abundant and variable.

*Cerithium algicola* C. B. Ad. Florida Keys. I think this is merely a form of the preceding.

*Cerithium semi-ferrugineum* Lam. The Keys.

*Cerithium literatum* Born. The Keys. Quite variable in form, coloring, and sculpture. Some of the lighter colored forms are very nodulous; others are nearly smooth.

*Cerithium ferrugineum* Say. Abundant on the Keys; rarely found by me on the west coast. Much confusion exists concerning this shell. *Pyræzus minimus* Gm., is often mistaken for this species, and its so-called variety *versicolor* of C. B. Adams, which it somewhat resembles in size, form, and sculpture. *C. ferrugineum* is a solid shell, the aperture is smaller and is lirate within, the nodules are more distinct, and, upon the whole, it is a rougher shell. In *Pyræzus minimus* the nodules are pinched up into longitudinal plications, which become evanescent on the lower part of the whorls. I consider the variety *versicolor* C. B. Ad., of *Cerithium ferrugineum*, of no value. Mr. Tryon separates *C. rissoideum* Sowb., and states in the manual that it is smaller, always white or yellowish white, and that the sculpture is slightly dif-

ferent. My extensive suit of these shells from Tortugas does not show any distinction even as a variety, as the variation is from the most slender forms to those almost pupoidal, and with every shade of color from dark brown, through various patterns of painting, to pure white. Some of these shells are not over 6 mm. in length. *C. erienne* Val. is a synonym of *ferrugineum*.

*Cerithium muscarum* Say. A most beautiful and abundant form in Florida. A small, very delicate variety, with chestnut-colored punctations, is found on the Keys; and I also have it from the Bermudas and Honduras, but it connects with the type.

*Cerithium guiniacum* Phil.? A broken and slightly worn shell was picked up at the Tortugas which agrees well with this species, and is certainly like nothing else that I have seen. I have another worn specimen of the same from Uilla, Honduras.

*Bittium varium* Pfr. Abundant from New York to Florida, and varying from a dirty white to chocolate, with light colored varices.

*Cerithiopsis tubercularis* Mont. Tortugas. A single fresh shell, the var. *accula* Brus., perhaps, having a broad whitish band above the suture.

*Cerithiopsis greenii* C. B. Ad. Tortugas.

*Cerithiopsis punctatum* L. Tortugas; Tampa Bay. Better known as *C. emersoni* C. B. Ad.

*Cerithiopsis florum* C. B. Ad. Two slightly worn shells were found at the Tortugas.

*Cerithiopsis pulchellum* C. B. Ad. Tortugas.

*Cerithiopsis kobelti* Dall. Tortugas.

*Seila terebrale* C. B. Ad. Common on the West coast and Keys; Cedar Keys, from Mr. Hinkley.

*Potamides scalariformis* Say. Abundant throughout the West coast and Keys.

*Potamides iostoma* Pfr. Tampa and Sarasota Bays. Narrower than *P. scalariformis*, and at once distinguished by having varices.

*Potamides tenuis* Pfr. Tampa and Sarasota Bays.

*Potamides costata* Da Costa. One shell was found in Tampa Bay.

*Potamides turrita* Stearns. Shaw's point; three shells. Occasionally found elsewhere. Shells received from Cedar Keys, from Mr. Hinkley, and labeled *P. tenuis* Pfr. by Mr. Dall, I think are the same as this.

*Pyræzus minimus* Gm. One of the most abundant and variable shells of the west coast of Florida. Specimens vary from ashy white to almost jet black, and are often chestnut, chocolate, or even reddish. Many are beautifully variegated with spiral bands of white, chocolate, brown, and yellowish. The best distinguishing character is the slightly pinched up nodulous plications on the upper part of the whorls, but they are not always so marked, as I have specimens which are nearly smooth. It is *Lampanella septemstriata* Say., *L. nigrescens* Menke,

and *L. peloritana* Cantr. I have shells with the latter name said to be from the Mediterranean.

*Triforis decoratus* C. B. Ad. Tortugas; Tampa Bay.

*Triforis nigrocinctus* C. B. Ad. Tortugas; Tampa Bay.

*Triforis turris-thomae* Chem. Tortugas.

*Triforis intermedius* C. B. Ad. Tortugas.

*Triforis ornatus* Desh. Tortugas.

*Triforis variegatus* A. Ad. Tortugas.

\**Goniobasis papillosa* Anth. Holmes' Creek, West Florida. Mrs. George Andrews. Dead shells of this species were received from Mr. S. L. Cunningham, from Sumpter County.

*Skenea sulcata* Bush. Tortugas; very large.

*Rissoina pulchra* C. B. Ad. Tortugas.

*Rissoina striosa* C. B. Ad. Tortugas.

*Rissoina cancellata* Phil. Tortugas.

*Rissoina reticulata* Sby. West coast; probably Tampa Bay. The label containing locality of this species was lost.

*Bythinella monroensis* Frau. Ware's Creek; Pine Level.

*Bythinia tentaculata* Drap. Key West. These shells were found near a salt pond, dead, and slightly weathered, and may have been brought in ballast. I submitted them to Mr. Ancey, who identified them as above. I have the same shell, taken alive, from New York, where it has been introduced from Europe.

*Hydrobia wetherbyi* Dall. Pine Level, Manatee County.

*Amnicola floridana* Frau. Hillsborough River. Abundant on *Pistia spathulata*.

\**Gillia altilis* Lea. Sumpter County. T. L. Cunningham.

\**Vivipara georgiana* Lea. Beauclerc, Florida. F. C. Sawyer.

\**Vivipara subpurpurea* —. Sumpter County. T. L. Cunningham.

*Vivipara waltoni* Tryon? Key West. Dead shells were found with *Bythinia tentaculata* at the above locality, and were identified, with doubt, by Mr. Ancey.

\**Cameloma floridense* Call. Orange County. T. L. Cunningham.

\**Cameloma lima* Anth.? A shell was obtained from Mr. R. C. Stuart, marked Florida, which seems to agree well with Dall's figure and description of the above species, only that it is lighter in color.

\**Ampullaria depressa* Say. Sumpter and Volusia Counties, Cunningham; Orange County, Pilsbry.

*Ampullaria caliginosa* Reeve. Manatee County near Braiden Creek, one worn shell; Royal Palm Hammock, several hundred shells; Miami region; Cedar Keys. These agree in most respects with Dall's description in Hemphill's Shells. I have shells of *A. depressa* which are malleated, and have as large an umbilicus as *A. caliginosa*. Some shells of the latter species have a brownish operculum, and are not

marked with salmon. However, the shells of *A. caliginosa*, so far as I have seen, are generally heavier, the peristome is much thicker, and the whorls more globose than *A. depressa*. I have a lot of the latter from Havana, Cuba, which in form approach more nearly to *caliginosa* than my Florida specimens.

*Truncatella pulchella* Pfr. Tampa and Magill's Bays; East Florida, Cunningham.

*Truncatella caribæensis* Sby. Tampa Bay; Manatee River.

*Truncatella bilabiata* Pfr. Evans' plantation on Lost Man's River; Key West; abundant at Utilia Island, Honduras.

*Truncatella subcylindrica* Gray. Manatee River; Magill's Bay.

*Chondropoma dentatum* Say. Key West; Evans' plantation.

*Helicina chrysocheila* Binn. Sumpter and Volusia Counties, Cunningham. I have one or two specimens of this found at Cedar Hammock in Manatee County.

*Helicina orbiculata* Say. Key West; Manatee County, several localities; Evans' plantation. At the latter place, just on the borders of the everglades, a short distance above Cape Sable, I found this shell in great numbers, and varying greatly in color, ranging from pure white, cream color, and yellow, to red and purple, ashy blue, green, and beautifully variegated. Most of these were found living on the ground about rotting logs, but quite a number were taken alive on the trunks of cabbage and royal palms, in some cases as much as ten feet from the ground. This is the only instance in which I found any of the operculated land shells of Florida on trees. *Helicina dysoni*, a closely related species, was generally found on the under side of the leaves of *Thrynax radiata* at Utilia.

*Helicina subglobosa* Poey. Cedar Keys, Mr. Henry Hemphill. A few shells were found at Shaw's Point, at the mouth of the Manatee River.

*Nerita versicolor* Lam. Florida Keys.

*Nerita tessellata* Gm. Florida Keys.

*Nerita peloronta* Lam. Florida Keys.

*Neritina reclinata* Say. Ware's Creek; streams north of the Manatee River; Tampa. Generally badly eroded. Fresh and brackish water.

*Neritina reclinata*, var. *palmae* Dall. Manatee River; one shell.

*Neritina pupa* L. Tortugas, one shell; occasionally found here in abundance.

\**Neritina virginica* L. Florida Keys, William Bahrt. A large dark form.

*Neritina viridis* L. Tortugas. Several worn shells.

*Liotia muricata* Reeve. Tortugas.

*Liotia cruentata* Megerle. Tortugas Reefs, under stones at low water.

\**Liotia tricarinata* Stearns. Tampa, Stearns.

*Turbo castaneus* Lam. West coast. Occasionally thrown up in great numbers.

*Turbo crenulatus* Gm.? Received from Pensacola.

*Imperator caelatus* Chem. A large worn shell was found at Key West; one young shell was picked up at the Tortugas.

*Imperator caelatus*, var. *Cubensis* Phil. Tortugas; Key West.

*Imperator brevispina* Lam. Florida Keys.

*Imperator tuber* L. Tortugas; one young shell, somewhat worn.

*Imperator longispina* Lam. Tortugas.

*Imperator americana* Gm. Key West. Worn shells; Content Key; Sand Key; Tortugas; very abundant at low tide, living on dead coral.

*Livona pica* Gm. Little Content Key; Key West. Dead shells.

*Trochus indusii* Chem. Florida Keys.

*Trochus fasciatus* L. Tortugas. Abundant; very variable. A large form was found at Key West.

*Trochus tampaensis* Con. West coast. I found this shell on the mainland of Honduras, east coast.

*Margarita riisii* Dunker. Tortugas.

*Stomatella picta* D'Orb. Tortugas.

*Fissurella fascicularis* Lam. Key West.

*Fissurella fasciata* Pfr. Tortugas.

*Fissurella cancellata* Sby. Tortugas.

*Fissurella listeri* D'Orb. Key West; Tortugas.

*Fissurella gemmulata* Reeve. Tortugas. A large number of shells of this lovely little species were collected at Garden Key.

*Fissurella alternata* Say. West coast; not common. Found more abundantly at "The Rocks," Little Sarasota Pass, than elsewhere; East coast, Cunningham.

*Fissurella nodosa* Born. Tortugas.

*Fissurella barbadensis* Gm. Tortugas; Key West. A few shells of the rough variety.

*Fissurella barbadensis*. Smooth variety. One worn shell at Garden Key; Tortugas.

*Rimula frenulata* Dall. Tortugas. One shell was broken in sending to Mr. Dall for identification. He has since received this species from Turtle Harbor, Florida, and also from North Carolina.

*Emarginula tumida* Sby. Tortugas.

*Emarginula octoradiata* Gm. Tortugas.

*Emarginula octoradiata*, form *clausa* D'Orb. Tortugas; Key West.

*Emarginula octoradiata*, var. *depressa* Blainv. Tortugas.

*Emarginula emarginata* Blainv. Tortugas.

*Acmaea puncturata* Lam. Tortugas; Key West.

*Acmæa pustula* Helb. Tortugas; Key West.

*Acmæa notata* Lam. Tortugas. Key West.

*Acmæa melanoleuca* Gm. Tortugas.

*Acmæa melanoleuca*. White variety. Tortugas.

*Acmæa pulcherrima* Raws. Tortugas.

*Acmæa pulcherrima*, var. Tortugas. This beautiful little shell and the variety were washed ashore on Garden Key.

*Chiton apiculatus* Say. Dredged in Tampa Bay. Other localities on the west coast. Generally found adhering to dead shells.

*Chiton multicosatus* C. B. Ad. Key West, on coral rocks.

*Chiton astriger* Knorr. Tortugas, on coral rocks on the reefs.

*Chiton spiculosus* Knorr. Tampa Bay; west coast.

\**Chiton pectinatus* Sowb. Key West; low tide, Dr. William Rush.

*Tornatina candei* D'Orb. Tampa Bay.

*Actæon delicatus* Dall. Red-fish Point.

*Actæon floridanus* Con. Red-fish Point.

*Actæon punctostriatus* Adams. Tampa Bay.

*Bulla occidentalis* Ad. West coast and Keys. An abundant and most variable shell. At one time, after a storm, I found thousands of living examples washed ashore on the north beach of Egmont Key.

\**Bulla undata* Brug. Several fine shells were received of William Bahrt, collected by him on the South-east Keys.

*Bulla striata* Brug. Tortugas. A few dead shells. Abundant at Havana and Utila Islands; Honduras. Found in great quantities, fossil, in the hammocks south of the Manatee River, where many shells retain their coloring.

*Haminea succinea* Con. Salt Pond, Terracina Island, very large specimens; Egmont Key; Long Key.

*Haminea virescens* Sby. West coast; Salt Ponds, Terracina Island; mouth of Manatee River, etc. At one time, while collecting at Long Key during a very low tide, I found thousands of this species crawling about in a sheltered locality between tides, on a shelly beach, among a species of broad-leaved grass. They were all young.

*Haminea antillarum* D'Orb. Manatee River; Terracina Island. A beautiful and delicate shell.

*Hydatina physis* L. West coast; rare. I found broken shells at "The Rocks," Little Sarasota Pass, and at a few other localities. I have a shell from Mr. R. C. Stuart, collected on the west coast, locality unknown.

*Utriculus canaliculatus* Say. Mouth of Manatee River; Terracina Island.

*Aplysia protea* Rang? Marco. Abundant in the passes among the Ten Thousand Islands. Occasionally seen in Sarasota Bay.

*Glandina truncata* Gm. West coast and Keys; very variable. Sumpter County, Cunningham.

*Glandina truncata*, var. *parallela* W. G. B. Undoubtedly only a form of *G. truncata*. The heavy shell with cylindrical or compressed body whorl, I found mostly on shell mounds, where they seem to live on and around *Opuntia polyantha*; while the typical *truncata* was most abundant around ponds in pine woods. A small, red form was obtained at Evans' plantation, and another, something like *G. texasiana* in form, but shorter and more solid, and of a light salmon color, was found on Cape Sable.

*Zonites arboreus* Say. Rather plentiful in hammocks in and around decaying logs; Sumpter County, Cunningham.

*Zonites indentatus* Say. Usually found with *Z. arboreus*; Sumpter County, Cunningham.

*Zonites gundlachi* Pfr. Evans' plantation; Manatee County.

*Zonites fulvus* Drap. Evans' plantation; Monroe County; Cedar Hammock; and hammock near the village of Manatee, with *Z. gundlachi*.

*Zonites minusculus* Binn. Manatee County, several localities; Evans' plantation.

\**Zonites suppressus* Say. Gainesville, J. B. Upson; Fernandina, Henry Hemphill. I have a shell from Terracina Island, which I think is the same.

*Tebennophorus carolinensis* Bosc. Terracina Island, in heavy hammock.

*Microphysa vortex* Pfr. Goodland Point; Evans' plantation. Tolerably abundant in both localities.

*Helix (Polygyra) auriculata* Say. One of the most common land shells of Manatee County. Abounding around ponds in pine and hammock woods. The shell varies a good deal in size.

*Helix (Polygyra) uvulifera* Shutt. Found abundantly in a hammock south of the Manatee River.

\**Helix (Polygyra) postelliana* Bld. Callahan, J. B. Upson.

\**Helix (Polygyra) auriformis* Bld. Volusia County, Cunningham.

*Helix (Polygyra) cereolus* Mühl. Anna Maria, Passage, Mullet and Long Keys.

*Helix (Polygyra) carpenteriana* Bld. A very common form on the mainland near the sea. On Rabbit Key, near Cape Romaine, I found this species under *Agave rigida*, in such quantities that it could be scraped up in handfuls, and nearly all living.

*Helix (Polygyra) septemvolva* Say. Keys along the mouth of Tampa Bay. There is no doubt now that the above three are merely forms of one species, which Mr. Dall unites under the oldest name, *Helix cereolus* Mühl. In the summer of 1884, I found on Mullet Key a great number of living specimens of the above species, varying through every range of size and number of whorls from the smallest *carpenteriana* to the largest *septemvolva* or *cereolus*, and having an

equal diversity of coloring. There were some smooth shells, others with rib-like striae, as well as great variation in the height of spire and the carination of the outer whorl. In fact, it seemed as though all the forms I had hitherto met with of this protean species, were here mixed together, as if to prove at a glance that they were merely forms of one and the same thing.

*Helix (Polygyra) febigeri* Bld. Sumpter County, Cunningham; Key West. I cannot in any way distinguish these from shells with the same name from New Orleans. Those received from Mr. Cunningham were labelled *Polygyra febigeri*. Undoubtedly a form of *H. certolus*.

*Helix (Polygyra) pustula* Fer. Shaw's Point, at the mouth of the Manatee River; Cedar Hammock, and occasionally other localities in Manatee County; Gainesville, J. B. Upson.

\**Helix (Polygyra) pustuloides* Bld. Cedar Keys, J. B. Upson.

\**Helix (Polygyra) avara* Say. Sumpter County, Cunningham; Jacksonville, Hemphill.

\**Helix (Triodopsis) hopetonensis* Shutt. Jacksonville, J. B. Upson; Cedar Keys, Hemphill.

*Helix (Mesodon) major*. A single fine shell of this species was seen in the possession of Mr. R. C. Stuart, who collected it while on a cruise along the West coast.

*Helix (Mesodon) jejuna* Say. Point Pinellas on shell mound, abundant but dead; Terracina Island; banks of Ware's Creek; Braidenton; and Fogartyville. The only mollusk ever found in high dry pine woods in Florida. I have seen it crawling on barren dry sand near Braidenton, and around my dwelling, and along the road in Fogartyville.

*Helix (Mesodon) mobilia* Binn. This form of *jejuna* was found, associated with the typical shell.

*Helix (Strobila) hubbardi* Brown. Cedar Hammock, Manatee County; small and very light colored. A larger dark brown shell was found at Goodland Point, and Evans' plantation.

*Helix (Strobila) labyrinthica* Say. Cedar Hammock; hammock south of Manatee River, rather plentiful. Fossil also at the latter locality.

*Helix (Hemitrochus) varians* Menke. Key West.

*Helicodiscus lineata* Say. Terracina Island; Pine Level, in a swamp in moss about the roots of trees.

*Bulimulus multilineatus* Say. Key West; dead shells, but many of them large and in good condition. At Pine Key (Lower Keys) about one hundred and twenty fine large specimens were collected from trees and shrubs, at a few feet of elevation from the ground. All were attached (they were collected in May) by a thick epiphragm. Torch Key, a few dead shells. Mr. John Brown, of the U. S. Coast Survey Schooner "Quick," brought me about sixty living specimens from Caxonibas, of what seems to be a smaller, darker variety than those I collected.

*Bulimulus dormani* W. G. B. Several hundred dead shells were found in the heavy hammock north of the Manatee River, in the winter of 1884. The following summer I found a number of the same species, alive, at the above locality, crawling on the under side of the leaves of the cabbage palms. The animal is a beautiful porcelain color. Occasionally found in other localities in Manatee County. I have the same shell from Volusia County, from Mr. Cunningham.

*Orthalicus undatus* Brug. Key West. Dead shells of the typical form were found near the city.

*Orthalicus undatus*, var. Cape Sable. The variety figured in Binney's Manual of American Land Shells, p. 440, was found abundantly on trees at Cape Sable. Many of these were so firmly attached by the epiphragm that it was impossible to remove them without cutting the bark from under them. Several were broken in attempting to twist them off.

*Liguns fasciatus* Mull. Goodland Point; abundant. At this locality a water bucketfull of this species was collected from the trees in a few hours, in one of the most terribly tangled tropical thickets I ever saw. They seemed to appear in greatest numbers during cloudy and misty weather. On one such morning I found the trees and shrubs full of them, but the mosquitoes and sand-flies, which take advantage of such weather, were so intolerable that I was compelled to retreat. The variety found here was either pure white, or slightly marked with greenish or brown lines on the body whorl. At Cape Sable some of the shells were marked with a broad spiral band of brilliant orange, and on one shell the band was bright green. At Rabbit Key the variety was found, having a wide brown band, and at Pine Key a very large form, greatly elongated, with flattened whorls, and beautifully marked with brown, green, blue, and purple, on a yellow ground, one of the loveliest land shells I have ever seen. All these forms had the columella and tip of the spire stained with pink. At Pine Key one living shell was found, of a chalky-white throughout, and having a single very narrow olive line on the body and next whorl, the columella being as distinctly truncated as most of the African *Achatinas*. *Liguns fasciatus* is reported to me on good authority from as far north as Sanibel Island, at the mouth of the Caloosahatchie.

*Stenogyra gracillima* Pfr. Key West. Found abundantly, mostly dead, near high tide mark.

*Stenogyra subula* Pfr. Key West; about twenty living examples.

*Macroceramus pontificus* Gld. Point Pinallis, on shell mound with *Helix jejuna*; Shaw's Point.

*Macroceramus gossei* Pfr. Key West; Evans' plantation.

*Pupa fallax* Say. Point Pinallis; Long Key; Anna Maria and Passage Keys.

*Pupa rupicola* Say. On shell mounds and in heavy hammocks; abundant.

*Pupa armifera* Say. Low hammock south of the Manatee River.

*Pupa contracta* Say. With *P. armifera*, Manatee County; not rare.

*Pupa pentodon* Say. Old fields south of Manatee River; Magill's Mound, on Terracina Island.

*Pupa floridana* Dall. Cedar Hammock, south of Manatee River.

*Strophia incana* Binn. Key West, abundant but mostly dead, on lands occasionally overflowed by high tide; Torch Key; Pine Key (Lower Keys). At the latter place thousands of living shells were found, many on the ground among leaves and at the roots of trees, and others on bushes with *Bulimulus multilineatus*, though not often climbing over four or five feet high.

*Succinea luteola* Gld. Ponds near Braidentown. Very abundant.

\**Succinea effusa* Shutt. Sumpter County, Cunningham.

*Succinea campestris* Say. Key West; keys in the vicinity of Tampa Bay. Abundant.

*Succinea obliqua* Say. One fine shell from a pond near Fogartyville, Manatee County, is identified as this by Mr. Dall, with certainty. I believe this is the first time it has been reported with certainty from Florida.

*Succinea avara* Say.? With the above two or three specimens, Mr. Dall identifies them with doubt. The whorls are quite flat for that species, but they agree better with figure and description of this than anything in Binney's Manual.

*Veronicella floridana* Binn. Terracina Island, around dwellings and under lumber.

*Auricula pellucens* Menke. Evans' plantation, on land occasionally covered by high tide, abundant; Lost Man's Point; mouth of Caloosahatchie River; Torch Key, plentiful on low ground.

*Carychium exiguum* Say. Found living in a low wet hammock near Palma Sola. Identified by Mr. Dall and Mr. C. F. Ancey. This is the first time, I believe, that it has been reported from Florida.

*Melampus flavus* Gm. North side of Manatee River, in salt ponds.

*Melampus lineatus* Say. North side of Manatee River; Cedar Keys, Upson.

*Melampus lineatus*, var. Both species and variety found with *M. flavus*.

*Melampus caesus* L. Common. A very large and fine form was obtained abundantly on mud flats near Magill's Mound.

*Melampus floridanus* Shutt. Evans' plantation, with *Auricula pellucens*.

*Melampus floridanus*, var. An elongated form, which is probably a variety of this, was found in salt ponds north of the Manatee River. It somewhat resembles in form a small *Detracia bulloides*.

*Melampus (Detracia) bulloides* Mont. Key West, abundant, though mostly dead; Red-fish Point.

***Tralia (Alexia?) minuscula* Dall.**

"Shell minute, smooth, yellowish white, with about five whorls beside the minute, rounded, sinistral, half-immersed nucleus; spire moderately elevated, pointed; sculpture of fine regular impressed lines, parallel with the incremental striæ; suture distinct; last whorl with nearly parallel sides, rounded and slightly attenuated base; columella stout, strongly twisted, white, short, outer lip nearly straight, somewhat thickened, especially anteriorly, not lirate or denticulate internally; body with two revolving ridges, the posterior one fainter and placed in advance of the middle of the whorl; a slight wash of callus on the body; aperture about one-third as wide as the body whorl to the left of it, pointed behind, rounded and slightly oblique in front. Soft parts unknown.

"Lon. of shell, 3.8 mm.; of last whorl, 3.0 mm.; maximum diameter of shell, 2.0 mm.

"This interesting little species was found in the wash of the beach at Magill's Bay, Tampa, by Mr. Simpson, in moss in a dried-up marsh near Tampa, by Dr. Velie, and on the shores of the lagoon at Exuma Island, Bahamas, by Dr. J. J. Brown, and by the U. S. Fish Commission in 1885. The soft parts are unknown, and its reference to *Tralia* is, therefore, provisional only. It differs from *Tralia, sensu stricto*, as typified by *Tralia pusilla*, in the absence of the wave and internal ridge in outer lip. This, however, may be only a specific character. At all events, it is without the internal liræ of *Melampus*, etc., and until the character of the foot is known, may perhaps best be located in the above-mentioned group."

The above is Mr. Dall's description of this species. Only three or four specimens were found.

*Pedipes naticoides* Stearns. Beach at Magill's Mound.

*Pedipes elongatus* Dall. I found the last three species occasionally at the above locality, washed up in grass, with quantities of several species of *Truncatella*, *Cerithium nigrescens* and *muscarum*, *Columbella rustica*, and a number of other small species.

*Blauneria heteroclita* Mont. With the above; rare.

*Linnæa humilis* Say. Terracina Island; ponds south of the Manatee River. Abundant. In the month of November, 1884, I found this species with eggs deposited on the outside of their shells. Also found near Tampa. Smaller and darker colored than those I have collected in the Northern States.

*Linnæa columella* Say., var. *casta* Lea. Pond near Fogartyville, Manatee County.

*Physa pomilia* Conrad. Ponds in pine woods, Manatee County.

*Physa heterostrophæ* Say. Ponds, Terracina Island.

*Physa elliptica* Lea. Pond near Fogartyville.

\**Physa gyrina* Say. Volusia County, Cunningham.

\**Ameria scalaris* Jay. Sumpter County, Cunningham.

*Planorbis trivolvis* Say. Ponds on Terracina Island.

*Planorbis tumidus* Pfr. Ponds south of Manatee River; sluggish stream in Cedar Hammock. A Cuban species also found in Mexico.

*Planorbis Duryi* Wetherby. Volusia County, Cunningham; Orange County, Pilsbry; Royal Palm Hammock, associated with *Ampullaria caliginosa* and *Cyrenoida floridana*, on a low wet prairie.

*Planorbis exacutus*, Say. Pine Level, Florida, in a swampy stream; young.

\**Planorbis glabratus* Say. Mayport. Several beautiful shells were received from Mr. F. C. Sawyer.

*Ancylus filusus* Con. Ponds near Fogartyville.

\**Ancylus obscurus* Hald. Ferguson's Pass, Hemphill.

*Siphonaria alternata* Say. Key West.

*Siphonaria alternata*, var. *brunnea* Hanley. Key West; abundant on rocks at high tide.

\**Siphonaria lincolata* D'Orb. St. Augustine, Hemphill; East coast, Cunningham.

*Dentalium disparile* D'Orb. Dredged in seven or eight fathoms, in Tampa Bay.

*Dentalium lubricum* Dall. Tortugas.

*Dentalium antillarum* D'Orb. Tortugas; dead shells.

*Dentalium coarctatum* Lam. Tampa Bay.

*Rocellaria ovata* Sby. Two specimens were found burrowing in coral on Sand Key, Tortugas. One living example was dredged in Tampa Bay. Another was found burrowing in the shell of *Arca Noë*, in Little Sarasota Pass.

*Rocellaria rostrata* Speng.? A living shell was accidentally broken on being taken from its burrow in the rocks on Little Content Key, which agrees quite well with the figure of this species.

*Teredo norvegica* Speng. Taken from timber in the Manatee River.

*Xylotrya bipinnata* Jeffr. Burrowing in lumber of the Floating Dry Dock, Manatee River.

*Pholas costata* L. Although this is a West Indian shell (it extends as far south as Patagonia), it seems to attain its greatest size and beauty at Cedar Keys, so far as I have examined specimens from the Florida coast. A shell from that locality in my collection is about eight inches in length, and very beautiful. Those in the vicinity of Tampa Bay are smaller, while at Cape Sable, where odd valves are washed up by the thousand, I did not find one over five inches in length.

*Pholas truncata* Say. West coast, occasional valves; and quite abundant at Cape Sable.

*Martesia cuneiformis* Say. A large number of shells were found by Mr. R. C. Stuart, on the West coast, in a floating palmetto log. I found shells at Long Key and Tortugas. Cedar Keys, Hemphill.

*Martesia smithii* Tryon. A fine shell was dug out of an old vessel in the Manatee River.

*Solecuretus gibbosus* Speng. Manatee River, on sandy, muddy flats.

*Solecuretus divisus* Speng. West coast; common.

*Solen viridis* Say. Manatee River; Tampa and Sarasota Bays.

*Saxicava (Paramya) subovata* Con. Dredged in Tampa Bay.

*Corbula swiftiana* Ad. Red-fish Point; Tortugas.

*Corbula nasuta* Say. Dredged abundantly in Sarasota and Tampa Bays.

*Pandora trilineata* Say. Something like one hundred and fifty living specimens and a number of dead ones were dredged in Tampa Bay. One or two valves were previously found washed ashore on Passage Key. Mr. Dall supposed this to be a new species, but found, on referring to Say's original figure and description, that it was the shell he had named *P. trilineata*, and that the heavy New England shell usually called by that name is undescribed.

***Pandora (Kennerlia) bushiana* Dall.**

*Pandora (Kennerlia) bushiana* Dall. Rep. Blake Moll. Bull. Mus. Comp. Zool., XII., p. 312, September, 1886:

"Shell small, with the beaks very anterior; the anterior cardinal margin marked with a sharp keel, cutting off an almost lineal area; the margin descends from the beaks in a straight line, the basal curve commencing suddenly at a rather obtuse angle, then following an even curve, and slightly inflexed only near the posterior tip below the short, square-ended rostrum; the shell very thin, the left valve somewhat convex, the right one concave, both sculptured with silky concentric striæ; the margins of the two valves coincident; beaks small, hardly rising above the long convex arch of the posterior cardinal margin; the right valve with a strong keel on its upper posterior margin, and no other radiating sculpture, left valve with an impressed line from the beaks to the base, a little behind them, but which does not indent the basal margin; there is also a sharp thread from the beak to the lower angle of the rostrum; above this thread, as usual, the lines of growth are coarse.

"I. on. of shell, 11.5 mm.; of anterior portion, 2.0 mm.; height, 5.5 mm.; and diameter about 1.0 mm.

"This species, which differs from all others of the group known to me, in having the rostrum bent down instead of upward, and the posterior cardinal margin convex instead of concave, was dredged alive in six fathoms mud, Tampa Bay, Florida, by Mr. Charles T. Simpson."

The above is Mr. Dall's description of this new species, of which some half-dozen or more specimens were obtained. It was sent to him for determination, together with other small species.

*Thracia rugosa* Con. Long Key, one shell; mainland of Honduras, east coast, one shell. Mr. Dall thinks this may be *Thracia distorta* Mont.

*Periploma angulifera* Sby. Tortugas, one shell; Egmont Key, several shells.

*Lyonsia floridana* Con. Common in Tampa Bay.

*Lyonsia beana* D'Orb. Sanibel Island, one shell; one shell found on the east coast of Honduras.

*Macra similis* Say. West coast. The most common bivalve in the vicinity of Tampa Bay. It becomes less common to the southward.

*Macra fragilis* Chem. Tampa Bay and vicinity.

*Macra oblonga* Stm. West coast; rare. Several specimens were washed up at the mouth of the Manatee River, after a storm. The same shell was picked up on the east coast of Honduras. I cannot separate this from *M. fragilis* Chem., nor from shells with the latter name and authority received from the west coast of Central America.

*Macra lateralis* Say. Occasional odd valves picked up on the West coast. A number of young living shells were dredged in Terra-ciea Bay.

*Rangia cyrenoides* Desm. I have never found this shell living. Fossil shells were occasionally collected on Egmont and adjoining Keys.

*Labiosa lineata* Say. Odd valves are rarely found on the West coast, especially the inner shore of Sanibel Island. I have a fine pair from R. C. Stuart, locality not known.

*Labiosa canaliculata* Say. Odd valves often found washed up on the West coast. Very common at Sanibel, where a few normal pairs were picked up.

*Ertilia nitens* Turton. Tortugas.

*Ertilia concentrica* Gld. Tortugas; Passage Key; Long Key.

*Abra angulata* Holmes. Egmont Key.

*Abra aequalis* Say. Varieties, Egmont Key.

*Semele obliqua* Wood. Egmont Key; young. A fine pair was picked up on Loggerhead Key.

*Semele cancellata* D'Orb. Dredged several pairs and odd valves in Tampa Bay. A peculiar pink variety was found on the inner shore of Anna Maria Key.

*Semele reticulata* Lam. Abundant at Long Key, and occasionally found elsewhere. At Loggerhead Key a rayed form was picked up.

*Cumingia tellinoides* Con. Anna Maria Key; Long Key; Tortugas.

*Asaphis deflorata* L. Tortugas, one shell.

*Heterodonax bimaculatus* L. Tortugas, one valve. This California shell was found abundantly at Utila Island, Honduras, on sandy beaches.

*Tellina magna* Speng. West coast; rare. This magnificent shell was occasionally picked up on outside beaches, and two or three pairs were found in Long Boat Inlet, near Sarasota Bay. These shells are much darker colored than specimens I have from the Bermudas and the West Indies.

*Tellina iris* Say. Abundant; living on sand flats in Sarasota Bay.

*Tellina interrupta* Wood. Tortugas; Key West.

*Tellina radiata*, var. Tortugas.

*Tellina decora* Say. Rather common on the lower Keys. Several shells of this lovely species were found on Long Key.

*Tellina decora*, white var. Long Key.

*Tellina tumida* Sby. Red-fish Point, one shell; dredged in Tampa Bay; one shell found on the east coast of Honduras.

*Tellina mera* Hanley. Key West; Tortugas.

*Tellina striata* Chem. Cape Sable.

*Tellina souleyetiana* Recl. Dredged in Manatee River.

*Tellina polita* Say. Tampa Bay.

*Tellina tayloriana* Sby. Tortugas.

*Tellina alternata* Say. West coast; rare.

*Tellina alternata*, pink variety. One living shell was dredged in Tampa Bay.

*Tellina levigata* L. Mouth of Manatee River; small.

*Tellina lineata* Turton. Tortugas.

*Tellina lineata*, var. *albida* Hanley. Long Key.

*Tellina brevifrons* Say. Dredged in Tampa Bay.

*Tellini gouldii* Hanley. Tortugas.

*Tellina punicea* Born. Near Marco, one fine specimen; Cape Sable, abundant.

*Macoma constricta* Brug. Manatee River; Lost Man's Point.

*Macoma anomala* Desh. Long Key.

*Macoma tampaensis* Con. West coast.

*Macoma fausta* Dillw. Several fine pairs were found at Key West.

*Macoma proxima* Gray? Lost Man's Point.

*Lutricola gruneri* Phil. Odd valves were rarely found on the west coast. One perfect shell was picked up at Key West.

*Strigilla pisum* L. Key West; Tortugas. Variable in form and color.

*Donax variabilis* Say. West coast; very abundant on sandy beaches. This beautiful species lives between tides, and, in many places, every wave brings up thousands of them. As the wave retreats, they almost instantly burrow out of sight in the sand. A single handful of sand will often contain a dozen specimens. They vary through every hue of the rainbow, but their brilliancy soon fades on being taken from the water.

*Donax denticulatus* L. Key West.

*Donax fossor* Say. Mayport, J. B. Upson; West coast, occasionally; Anna Maria and Passage Keys.

*Choristodon typicum* Jonas. In corals, Sand Key, Tortugas.

*Petricola divaricata* Chem. Scattered valves, Tortugas.

*Venus flexuosa* L. Common at Terracina Island, many shells beautifully marked with zigzag lines.

*Venus flexuosa*, var. A dark brown-colored variety was found with the above.

*Venus murtoni* Con. The common edible clam of Florida, sometimes growing to an immense size, and having very heavy shells. It is usually found in shallow muddy bays, and is obtained by "treading out," though it is sometimes washed up from outer beaches. I have a pair of shells which weigh five pounds.

*Venus murtoni*, var. *fulgurans* Tryon. The shell thus named is only a young form of the preceding, marked with chevron-shaped brown lines, and sometimes very beautiful.

*Venus cancellata* Chem. West coast. In some places, notably at Mullet Key, the worn valves of this species are thrown on shore by the ton, yet it is rather rare as a living shell. I have never obtained it by dredging in the open gulf, and have rarely seen normal pairs thrown up on outer beaches.

*Venus interpurpurea* Con. Egmont Key; rare. Odd valves of what seems to be this species were found on the mainland, east coast of Honduras.

*Venus pygmaea* Lam. Tortugas; dredged in Tampa Bay.

*Venus pygmaea* Lam., var. *inaequivalvis* D'Orb. Tampa Bay; dredged living in eight fathoms. Picked up dead and worn at Egmont Key and the Tortugas.

*Venus beauri* Recl. Tortugas.

\**Venus paphia* L. Odd valves were obtained by William Bahrt on the south-east Keys.

*Venus listeri* Gray. Valves were found at Key West. A half-dozen fine pairs were obtained on sandy flats at the Marquesas Keys.

*Venus granulata* Gm. Valves, Tortugas.

*Cytherea gigantea* Gm. West coast; very common. A large and beautiful shell.

*Cytherea maculata* L. West coast; rather rare. A very handsome species.

*Cytherea convexa* Say. A New England species, of which single valves were picked up at Long Key.

*Cytherea dione* L. Young, Tortugas.

*Cytherea conradina* Dall. Long Key, Sarasota Bay. This shell varies a good deal, some forms being pure white, quite solid, and inflated, others with purple interior and zigzag markings on the outer surface. Another form is somewhat flattened and drawn out, after the manner of *Venus flexuosa*.

*Cytherea circinata* Born. A single young pair was found at Tortugas.

*Cytherea hebraea* Lam. Tortugas.

*Cytherea (Trigona) incerta* Röm. Tortugas; one young shell.

*Circe (Gouldia) cerina* C. B. Ad. Dredged in Tampa Bay, and off Horse and Chaise. Found on Egmont Key.

*Dosinia elegans* Con. Very abundant at Sanibel Island; occasionally found elsewhere on the West coast; near Fernandina, F. C. Sawyer.

*Dosinia Discus* Reeve. I have a few shells of this species from the West coast. It is known to extend from the Carolina coast to Vera Cruz, Mexico.

*Dosinia tenuis* Dkr. Little Sarasota Key.

*Cyrena floridana* Con. A salt water species, usually rather rare on the West coast, but abundant on sand flats at Terracina Island.

*Cyrena carolinensis* Lam. Hillsborough River at Tampa; near Fernandina, F. C. Sawyer; Manatee River; Braiden Creek, unusually large and fine; Ware's Creek. It is a brackish water species, so far as I have seen. I have it from near Havana.

*Sphaerium partumeium* Say. Pond south of the Manatee River. Identified by Mr. Ancey, with doubt. I have compared these shells with those of the above named species from New York, and believe they are both the same.

*Pisidium abditum* Hald.? Brook near Fogartyville.

*Pisidium* sp. ind. Evans' plantation.

*Coralliophaga hornbeckiana* D'Orb. Tortugas; scattered valves.

*Cypricardia coralliophaga* Gm. Tortugas; valves.

*Cardium magnum* Born. A magnificent shell, and one of the most abundant bivalves on the West coast. I have it from near Fernandina.

*Cardium isocardia* L. West coast.

*Cardium muricatum* L. West coast.

*Cardium bullatum* L. West coast; rare.

*Cardium medium* L. Occasional valves were found at Key West. One valve in good condition was picked up on Egmont Key.

*Cardium petitianum* D'Orb. Valves were found at Tortugas.

*Lævicardium mortoni* Con. West coast, rather common; Red-fish Point. Dredged in quantities, living, in the mouth of the Manatee River, and in Sarasota and Tampa Bays; variable in size and coloring.

*Lævicardium serratum* L. Marquesas Keys, several fine shells.

*Lævicardium lævigatum* L. Valves often washed up on the West coast, but perfect pairs are rare.

*Chama macrophylla* Chem. Garden Key, Tortugas, on piling of an old wharf, large and fine. Small shells are occasionally found on the West coast.

*Chama arcinella* L. West coast.

*Lucina lintea* Con. Dredged in Manatee River; Terracina Island; Long Key.

*Lucina squamosa* Lam. Terracina Island; Tampa Bay; Long Key, etc.

*Lucina floridana* Con. West coast; abundant in Sarasota Bay.

*Lucina tigrina* L. Very abundant at the Marquesas, on sand flats.

*Lucina jamaicensis* Lam. West coast; found in Ware's Creek and Manatee River in immense numbers during very low tides.

*Lucina pecten* Lam. Sarasota Key; dredged in Tampa Bay.

*Lucina pecten*, yellow variety. Key West.

*Lucina crenulata* Con. Dredged in Sarasota and Tampa Bays.

*Lucina trisulcata* Con. Dredged in Tampa Bay; Red-fish Point; Manatee River.

*Lucina pennsylvanica* L. Tampa Bay, on sand flats; Marquesas Keys; abundant.

*Lucina tenui costata* Con. Tampa Bay.

*Lucina costata* D'Orb. Tortugas.

*Lucina quadrisulcata* D'Orb. Tortugas.

*Lucina muricata* Chem. Garden Key, Tortugas.

*Cyrenoida floridana* Dall. One pair at Long Key; Royal Palm Hammock, on the borders of the everglades, on a wet prairie, with *Ampullaria calliginosa* and *Planorbis duryi*; rather plentiful. This prairie lay just above the level of ordinary tide, and is probably occasionally submerged with brackish water.

*Diplodonta candeana* D'Orb. Tortugas.

*Diplodonta semiaspera* Phil. Tortugas; dredged in Tampa Bay.

*Diplodonta soror* C. B. Ad. Tortugas, valves washed ashore.

*Loripes edentula* L. Odd valves are very abundant, washed up on the West coast. Perfect shells are rare.

*Lasea rubra* Mont. Tortugas; one pair.

*Lepton bowmani* Holmes. Tortugas.

*Lepton fabagella* Con. West coast, scattered valves; Little Sarasota Key, etc.

*Crassatella lunulata* Con. Dredged alive, abundantly, near the mouth of the Manatee, and off Casey's Pass. Found dead, washed ashore on Egmont and Passage Keys. Mr. Dall believes this to be *Gouldia mactracea* Linsley.

*Parastarte triquetra* Con. This beautiful but minute shell was found occasionally around Tampa Bay, and was dredged in Sarasota Bay.

*Cardita floridana* Con. Long Key; lagoon at Magill's Mound, very large and abundant.

*Cardita floridana*, var. A pure white variety was obtained at the latter locality.

*Venericardia perplana* Con. One or two dead shells were found on Egmont Key. Several living shells were dredged at the mouth of the

Manatee River, with the next. In old specimens the outer edge of the shell is sometimes greatly thickened. It goes to Cape Hatteras, and is there found fossil.

*Pleuromeris tridentata* (Say.) Con. Dredged living, abundantly, at the mouth of the Manatee. Occasionally found dead, washed up on Egmont.

\**Unio aheneus* Lea. Palatka, J. B. Upson; Gainesville, S. H. Wright.

\**Unio aquilus* Lea. Palatka, Upson.

*Unio buckleyi* Lea. Miakka Upper Lake, Manatee County, abundant and variable. A smaller and more inflated form was received from Mr. Cunningham, from Sumpter County.

\**Unio blandingianus* Lea. Gaylor Creek, Brevard County, Cunningham; Florida, without locality, Mr. William A. Marsh.

\**Unio buddianus* Lea. Orange County, Mr. Harry A. Pilsbry.

*Unio concavus* Lea. Miakka Upper Lake; East Florida, Cunningham; Orange County, Pilsbry.

\**Unio cunninghami* Wright. Volusia County, Cunningham; same locality, Pilsbry. Very close to forms of *U. buckleyi*.

\**Unio floridensis* Lea. Volusia County, Cunningham.

*Unio fuscatus* Lea. Very abundant in Horse Creek, Manatee County; Sumpter County, Cunningham. Received from other correspondents from various parts of the state. It appears to be a very common species.

*Unio hebes* Lea. Dry Branch, emptying into Ware's Creek, Manatee County. This little drain in the pine woods only contained water during the wettest part of the rainy season, not over three months in the year, yet in it I found thousands of living specimens, and a few which Mr. Marsh has identified as *U. bissellianus* Lea. They were only found along an extent of some ten or a dozen rods, and often dug out of dry sand; not a specimen was taken out either above or below this limit. Some of these which were taken out and laid in the grass in a sunny place, survived over three months without a drop of water.

*Unio jewettii* Lea. Miakka Upper Lake, Manatee County. *U. jewettii*, *U. blandingianus*, and *U. hebes* are close species, but I have always been able to separate them.

*Unio nigrinus* Lea. Horse Creek, Manatee County; Orange County, Pilsbry.

\**Unio ocmulgeensis* Lea. Lake Beresford, S. H. Wright.

*Unio paulus* Lea. Horse Creek, Manatee County.

\**Unio lepidus* Gould. Lake Beresford, Wright.

\**Unio obesus* Lea. Lake Beresford, Wright.

*Unio sudus* Lea. Miakka Upper Lake, Manatee County.

*Unio vesicularis* Lea. Horse Creek, Manatee County.

\**Unio rostriformis* Lea. Florida, without locality, Upson.

\* *Unio modioliformis* Lea. Florida, without locality, Upson.

*Unio bissellianus* Lea. Dry Branch, with *Unio hebes*, Manatee County.

*Anodonta couperiana* Lea. Miakka Upper Lake, Manatee County, young; Orange County, Pilsbry, adult.

*Nucula eborca* Con.? Dredged in Tampa Bay. Odd valves found in several localities in the vicinity of Tampa Bay.

*Leda jamaicensis* D'Orb. Dredged in Tampa Bay. Occasional odd valves found elsewhere.

\* *Arca pexata* Say. East coast, near Fernandina, F. C. Sawyer.

\* *Arca incongrua* Say. East coast, near Fernandina, Sawyer; South-East Keys, Bahrt.

*Arca domingensis* Lam. Tortugas Reefs, under stones, at low tide. Probably equal to *A. gradata* Brod., and *donaciformis* Reeve.

*Arca transversa* Say. Marquesas Keys; South-East Keys, Bahrt.

*Arca deshayesii* Stm. Key West.

*Arca floridana* Con. West coast, common, especially at Sanibel Island. Great quantities of young living shells were dredged in the Gulf of Mexico, near Gasparilla Pass.

*Arca fusca* Brug. Tortugas Reefs.

*Arca imbricata* Lam. Tortugas Reefs; Garden Key, among corals.

*Arca gradata* Brod. Tortugas.

*Arca candida* Chem. Several fine shells of this variety were taken on the Tortugas Reefs, at low water.

*Arca noæ* L. West coast; not rare.

*Arca noæ*, var. *americana* D'Orb. Tortugas; sometimes partially burrowing in rocks, at low tide. I have also found *A. imbricata* burrowing in rock and coral.

*Arca barbadensis* Pet., var. Tortugas.

*Arca modiola* Poli.? Rare. A few valves of this were found at "The Rocks," near Little Sarasota Pass.

*Arca ponderosa* Say. West coast; common. It is probable that when the West Indian *Arcas* are more thoroughly studied and the synonymy is unravelled, the number of species in the above list may be somewhat reduced.

*Pectunculus castaneus* Lam. Tortugas.

*Pectunculus pectinatus* Lam. Dredged at the mouth of the Manatee, in great abundance; young. Adult shells occasionally found at Egmont; fossil on Terracina Island.

*Mytilus exustus* D'Orb. Key West; Havana, Cuba. A beautiful shell.

*Mytilus cubitus* Say. Tampa and Sarasota Bays. Abundant among oysters, and in *Vermetus nigricans*.

*Mytilus domingensis* D'Orb. Among oysters, Tampa and Sarasota Bays.

*Mytilus hamatus* Say. Manatee River. Abundant in brackish water, among oysters.

*Mytilus larvalleanus* D'Orb. Key West.

*Modiola papyria* Con. Rare. Terracicia Bay, washed up on south side of the island; one large, broken shell in Terracicia Cut-off; south side of Manatee River, near Manatee, after a storm; Lost Man's Point. An exceedingly lovely and fragile shell. It is *M. patagna* Reeve.

*Modiola sulcata* Reeve. West coast, occasionally; salt pond on Terracicia Island; coast of Volusia County, Cunningham, large and firm.

*Modiola semicostata* Con. West coast; very common among mangroves, at high tide, nearly buried in the earth, and firmly moored by a *byssus*.

*Modiola tulipa* L. West coast; abundant. There seems to be two forms of this shell on the West coast, one large, hirsute, and beautifully painted with yellow, orange, scarlet, and brown, the colors showing through to the interior; the common form received from the West Indies and Bermudas, and a smaller shell shaded with blue and violet, and smoother.

*Lithodomus bisulcatus* D'Orb. Found living in blocks of *Vermetus*, on Long Key.

*Lithodomus forficatus* Rav. Found burrowing in living shells of *Chama macrophylla*, and in coral, Tortugas.

*Lithodomus niger* D'Orb. In coral, Tortugas.

*Botula semen* Reeve. In coral, Tortugas; Little Content Key.

*Modiolaria cinnamomea* Brug. Tortugas; scattered valves.

*Modiolaria lateralis* Say. Floating in Magill's and Tampa Bays, imbedded in *Algæ*.

*Modiolaria lignea* Reeve. A few shells of this fine species were found washed up on Shaw's Point, at the mouth of the Manatee River, and one specimen was taken alive on a sand-bar in Tampa Bay, near by; Tortugas, one shell. Not hitherto reported from the west coast of Florida.

*Dreissensia leucophæata* Con. Ware's Creek, Manatee County, between brackish and fresh water, attached to crevices of stones.

*Avicula atlantica* Lam. West coast. Often attached to floating *Algæ*.

*Avicula radiata* Leach. Tortugas; Florida Keys; West coast; abundant on Sanibel Island. Very variable.

*Avicula ala-perdici* Reeve. Tortugas, on piling; very large and fine. It may be a form of the preceding.

*Perna ephippium* L. Tortugas; one large valve. It is common at the Bahamas and Bermudas.

*Perna obliqua* Lam. Key West; abundant in crevices of rocks, between tides; Loggerhead Key. A very curious variety was found at the Tortugas and Key West, with attenuated valves, striped and variegated with ash and brown, quite different from the small black form found in crevices of rocks.

*Pinna seminuda* Lam. West coast. Sometimes thrown up on the outer beaches of the West coast by thousands, during a storm. Less common than the next.

*Pinna muricata* L. West coast, with *P. seminuda*, and in sheltered bays. On the inside of the outer Keys, I have often found it moored powerfully in a vertical position to a valve of *Venus mortoni*, and nearly buried in the sand and mud. In this position, the ends of its sharp ragged valves are dangerous to the barefooted shell collector.

*Pinna carnea* Gm. Florida Keys; rare. A few living specimens were taken at Tortugas, moored in the same manner as *P. muricata*, and one or two at the Marquesas Keys.

*Spondylus croceus* Chem. West coast; occasional valves. I have a splendid pair from the South-East Keys, from Capt. William Bahrt.

*Spondylus spathuliferus* Sby. West coast; odd valves. Several living shells were taken from piling at the Tortugas.

*Plicatula ramosa* Lam. West coast. Occasionally washed ashore in great numbers. Very variable.

*Lima scabra* Born. Tortugas; Bird Key, on corals, at low water. The animal is a brilliant orange scarlet.

*Lima squamosa* Lam. Bird Key; Tortugas. Animal purplish crimson.

*Lima tenera* Chem. One living specimen was found at Tortugas, with the other two species, and one was dredged in Tampa Bay. Animal scarlet. These are all beautiful objects when taken alive, the brilliant mantle showing with fine effect as the animal opens and closes its shell.

*Pecten fuscopurpureus* Con. Shell variable in form and color, ranging from scarlet to dark purple. West coast.

*Pecten antillarum* Recl. Tortugas; Key West.

*Pecten imbricatus* Gm. On corals, Bird Key; Tortugas, at low water, with the next species.

*Pecten ornatus* Lam. Key West; Garden and Bird Keys, Tortugas.

*Pecten ornatus*, var. A large purplish variety was found in the fort at Key West.

*Pecten hemicyclica* Rav. Odd valves were rarely picked up on the West coast. I have a pair from the South-east coast, given me by William Bahrt.

*Pecten exasperatus* Sby. Young living shells were dredged in Tampa Bay, also off Horse and Chaise.

*Pecten nodosus* L. Odd valves very rarely found washed up on the West coast. Normal pairs are seldom found, and are held at an extravagant price by local collectors.

*Pecten dislocatus* Say, West coast; Long Key. Several varieties. A small brilliant scarlet specimen was dredged in Tampa Bay, and I have a large pair from Long Key, which are a bright orange and brown.

*Pecten nucleus* Born. There can be but little doubt that this and *P. dislocatus* belong to the same species. After a storm I picked up, on the lower end of Anna Maria Key, over a hundred pairs of *P. nucleus*, which exhibited among them every pattern of coloring found in either. There were pure white shells, specimens variegated with white, orange, brown, and purple, others a uniform brown, and ashy, dotted with white; still others were pink, scarlet, purple, and various shades. As the young shells of *P. dislocatus* are thinner and less inflated than these, I am inclined to regard this rather as a small race than the young of that species, as has been surmised.

*Anomia glabra* Verrill. West coast; inhabiting dead shells. On one occasion I found millions of these fragile shells washed up, in perfect condition, on the upper end of Anna Maria Key. I have it from the east coast of Florida.

*Ostrea virginica* Gm. Everywhere common in bays and brackish water.

*Ostrea equestris* Say. Sarasota Bay.

*Ostrea parasitica* Lam. Tortugas; Honduras.

*Lingula pyramidata* Stimp. A few living specimens were dug out at Long Key, on the inner shore, at dead low tide, in a bank of mud and shells, in the winter of 1884. They were moored to shells, the pedicel extending down several inches in the mud, while the animal itself was found near the surface. I have found a few detached valves elsewhere on the West coast. It is found at Norfolk, Virginia, and on the coast of North Carolina, and is reported from Cedar Keys by Mr. Hemphill. It is the *L. antillarum* of Reeve.

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#### ADDENDA.

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*Murex salleanus* A. Ad. A species of *Murex* found on the West coast somewhat commonly, and which I have had repeatedly identified for me as above, is probably a form of *M. rufus* Lam. Mr. Tryon states that *M. salleanus* is probably synonymous with *M. pomum* Gm., but this is certainly an error. *M. rufus* has been erroneously called *M. adustus* Lam.

*Hydrobia monroensis* Frau. According to Mr. Pilsbry, the little shells from Hillborough River which are called *Amnicola floridana* Frau., in this paper, are not an *Amnicola*, at all, but are *Hydrobia monroensis*.

*Succinea avara* Say. From a pond near Braidentown. Is more likely *S. ovalis* Say.

*Natica sagraiana* D'Orb. Several shells were found at Tortugas.

*Gundlachia ancyliformis* Pfr. Three shells of this Cuban species were found in a hammock near Palma Sola.

**Natica** (*semisulcata* Gray, var.?) **Fordiana**, n. s.

Shell small, conic globose, white and shining throughout; whorls well rounded, plicately striate below the suture, where they are encircled by about six faint linear sulcalions, giving the spire and upper part of the body whorl a slightly decussated appearance; suture well impressed; umbilicus open, bounded by a sulcus; columella only slightly callously thickened; operculum corneous. Length .40 inches; diam. .30 inches.

Some twenty or thirty specimens of this fine little species were taken alive on sand-flats in Sarasota Bay, during a severe norther, in a locality laid bare only by heavy storms. I take great pleasure in naming it in honor of my friend, Mr. John Ford, of the Academy of Natural Sciences, of Philadelphia, who compared the shells of this type with the *Naticas* of the Academy's collection, and determined it to be new. It belongs to the subgenus *Lunatia*.

**MEMORANDA ON A COLLECTION OF FISHES  
FROM THE OZARK REGION  
OF MISSOURI.**

BY R. ELLSWORTH CALL.

*(Read before the Academy, May 27th, 1887.)*

THE collection upon which these notes are based was made during a portion of the months of June and July, 1886. The major portion of the collection, which comprised, all told, several thousand specimens, was obtained in the West Fork of the Black River and its smaller tributaries, Reynolds County; and in Jack's Fork and its tributaries, Shannon County — the Jack's Fork system being tributary to the Current River. A smaller proportion of the material was taken in the Piney River, Texas County, a tributary to the Gasconade. A very small collection was made, in early June, in the Meramec River, Dent County, a tributary to the Mississippi. It will therefore be seen that, with the exception of the two last-named localities, the material comes from the southern drainage of the Ozark Mountains. While presenting nothing new to science in the way of species, the collection is nevertheless valuable as throwing some light upon the ichthyic fauna of a region hitherto unexplored, as well as adding something to our knowledge of the geographical distribution of certain forms.

The character of the streams in which the collections were made is worthy of mention. Without exception, the streams on the southern slope were limpid, cold, and rapidly-flowing, with rocky and pebbly beds. Occasionally only were long reaches of comparatively still water, with muddy bottom, to be found. Collecting under these circumstances was difficult, and rendered doubly so by the small size of the seine employed. Hence it was that but few of the larger forms of fish were obtained, the major portion being shallow-water and top-swimming species.

The region is sparsely settled, and the fish appear to be little disturbed, and then only are those forms which attain a maximum size the quest of residents. Nearly all the fish secured by the local sportsmen are taken by the process of "gigging," a process withal which requires no little experience and skill. The species chiefly taken in that manner are the small-mouthed black-bass (*Micropterus*

*dolomieu*, Lacepede), channel-cat (*Ictalurus punctatus*, Rafinesque), common red-horse, or mullet (*Moxostoma macrolepidotum*, Le Seuer), and the pickerel (*Esox vermiculatus*, Le Seuer)—locally called "mountain-trout." Each of these forms is very abundant, the bass and pickerel apparently exceeding the remaining two in numbers.

To Dr. D. S. Jordan, of Indiana University, my thanks are especially due for his courtesy in examining and identifying the major portion of these species, and in the verification of others. Examples of most of the species, from many of the localities named, may be seen in the museum of the Indiana University, Bloomington, Indiana, and in the United States National Museum, Washington.

#### REGISTER OF SPECIES.

1. *ICTALURUS PUNCTATUS*, Rafinesque. (134.)\*

Piney River, Texas County. Not seen in the streams of the southern slope, though it doubtless occurs in them.

2. *CATOSTOMUS TERES*, Mitchell. (170.)

Jack's Fork, Shannon County; Tom's Creek, tributary to West Fork of the Black River, Reynolds County. [See Jordan's Catalogue for notes on the relation of this form to *C. commersoni*, and the use of the name *teres*.] The specimens taken were none of them over one-third grown.

3. *HYPERTELUM NIGRICANS*, Le Seuer. (171.)

Tom's Creek, Reynolds County; Meramec River, Dent County. Only young specimens taken.

4. *MOXOSTOMA MACROLEPIDOTUM*, Le Seuer. (185.)

West Fork Black River, Reynolds County; Jack's Fork, Shannon County; Meramec River, Dent County; Big Creek and Piney River, Texas County. This attractive sucker is very abundant throughout the interior of the continent. Very fine and large examples have been taken in the Des Moines and Raccoon Rivers, in central Iowa. It appears to be equally at home in the sluggish streams, characteristic of prairie regions, and in the clear and rapid streams of the mountains. It is largely used as a food-fish throughout the Mississippi Valley.

5. *CAMPOSTOMA ANOMALUM*, Rafinesque. (196.)

This most curious fish is exceedingly abundant in every stream in which collections were made. Unlike certain other fishes of wide dis-

\* The numbers in parenthesis are those prefixed to the species given in Jordan's "Catalogue of the Fishes known to Inhabit the Waters of North America, North of the Tropic of Cancer," Washington, 1885.

tribution—*e. g.*, *Etheostoma caeruleum spectabile*—the very great variations which it presents are those of form and size, rather than of coloration. The differences between the sexes are marked, and especially so are those between the young and old males. Drs. Jordan and Gilbert have called attention to these features in their admirable "Synopsis of the Fishes of North America." \* This species was, with the possible exception of the following form, the most abundant fish with which we met.

6. CHROMOMUS ERYTHROGASTER, Rafinesque. (202.)

West Fork Black River and Tom's Creek, Reynolds County; Sinking Creek, Spring Valley Creek, and Jack's Fork, Shannon County. In the smaller brooks and streams this beautiful cyprinoid was especially abundant. The very brilliant hues so characteristic of the species varied from pure white, on the ventral aspect, through all shades of coloration to bright yellow, orange, and red. In one locality particularly, in a mere rill tributary to Sinking Creek, the seine when landed presented a leaping mass of almost indescribable beauty of coloration. Hundreds of this richly-colored dace were taken at this locality—the richest found during the period of exploration. The males appear to be in the excess in point of numbers.

7. DIONDA NUBILA, Forbes. (212.)

Tom's Creek, Reynolds County, and Piney River, Texas County. This form was described as *Alburnops nubilus*, from the Rock River, Illinois. It was placed in *Cliola* by Jordan and Gilbert in their "Synopsis," and finally, for reasons stated by Jordan in "Catalogue," p. 21, note 1, placed in *Dionda*. The genus, as now limited, "is characteristic of the Rio Grande region." The species is the most northerly one of the group. It was rare in our collections in Missouri.

8. HYBOGNATHUS MEEKI? Jordan and Gilbert. (214.)

Several specimens from the West Fork of Black River, Reynolds County, and Jack's Fork, Shannon County, appear to be this species. It is not an abundant form in this locality, and does not appear in the collections made at any other points. It is said by the discoverers to be "abundant in the Ozark region of Missouri and Arkansas." From this circumstance our identification may be erroneous.

9. HYBOGNATHUS NUCHALIS, Agassiz. (216.)

Piney River, Texas County, and Meramec River, Dent County. Two specimens only were taken.

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\* Bulletin U. S. Nat. Museum, XVI., 1882.

## 10. NOTROPIS DELICIOSUS, Girard. (233.)

Rare in Piney River, Texas County.

## 11. NOTROPIS NOTATUS, Girard. (258.)

This species was very abundant in each of the following localities: West Fork of Black River and Tom's Creek, Reynolds County; Jack's Fork, Spring Valley Creek, Barren Creek, and Sinking Creek, Shannon County; Piney River, Texas County.

## 12. NOTROPIS GALACTURUS, Cope. (262.)

This species occurred in sparing numbers in Jack's Fork, and in large numbers in Spring Valley Creek, Shannon County. This is the most westerly and southerly locality yet recorded for this species. Indeed, I am not aware that it has hitherto been reported from west of the Mississippi. Its bright steel-blue color, when moving rapidly about in the midst of schools of minnows, makes it a conspicuous object in the clear mountain streams which it inhabits.

## 13. NOTROPIS MEGALOPS, Rafinesque. (273.)

This form occurred in every stream in which collections were made. It is a singularly variable fish—some of its variations having received sub-specific or varietal designations. It is described by Jordan and Gilbert in "Synopsis," pp. 186-187, under the name of *Minnilus cornutus*, Mitchell.

## 14. NOTROPIS ZONATUS, Agassiz. (275.)

Abundant in all streams examined on both slopes.

## 15. NOTROPIS SCABRICEPS, Cope. (287.)

West Fork of Black River and Barren Creek, Reynolds County; Jack's Fork and Spring Valley Creek, Shannon County. This form and the two following occurred rarely. Of the three, this is the most generally distributed over the region explored.

## 16. NOTROPIS UMBRATILIS, Girard. (297.)

Spring Valley Creek, Shannon County. This is a little-known species, and occurred to us only in this single locality. It was originally described from the Arkansas River.

## 17. NOTROPIS MICROPTERYX, Cope. (311.)

This form occurred rarely in Spring Valley Creek, Shannon County. It is another of those mountain species now for the first time credited to the region west of the Mississippi. It was described from the "head-waters of the Cumberland and Tennessee Rivers."

18. *SEMOTILUS ATROMACULATUS*, Mitchell. (347.)

West Fork of Black River, Tom's Creek, and Barren Fork, Reynolds County; Spring Valley Creek, Shannon County; Big Creek, Texas County; Meramec River, Dent County. This is a very common chub in all streams, specimens of maximum size occurring in most localities where collections were made. The tubercles of the males had not all been lost in late June.

19. *FUNDULUS CATENATUS*, Storer. (569.)

This cyprinodont was very common in all streams on the south slope of the Ozarks, in all localities visited. It is another of those forms which were originally described from the mountain streams of the Alleghanies. The highly-colored caudal fins of the larger males were an especially attractive feature of the schools when swimming near the surface. They are powerful swimmers, often springing clear of the seine when brought near the banks for drawing. Especially large and fine specimens were taken in Jack's Fork.

20. *ZYGONECTES NOTATUS*, Rafinesque. (576.)

West Fork of Black River, Reynolds County, and Jack's Fork, Shannon County. Quite rare in the collections made in these streams, and all taken evidently males.

21. *ESOX VERMICULATUS*, Le Seuer. (598.)

Sinking Creek, Spring Valley Creek, and Jack's Fork, Shannon County. This species, which is locally called "mountain-trout," and occasionally "pike," is abundant in all of the larger streams in the mountains of Missouri. It delights to quietly loiter in the shelter of the pads of the pond-lily and in the shadows of the dense masses of *Potamogeton*, a few inches below the surface of the water. Motionless, in such situations, it awaits the coming of the unwary minnow, when, quicker than thought, it darts upon its prey, and, while you look, slowly sinks from sight. There is no apparent motion of fin or tail, but, ere you realize it, the "ravenous beauty" is gone. Its coming to the surface is as motionless and unexpected. Happening upon a favored locality, a somewhat deep expansion of Spring Valley Creek, upon the surface of which were dense growths of pond-weeds, with occasional clear spaces, one could, at any time during the early evening, see a half-dozen rising slowly to the surface. It was not long before we learned how dainty a supper a well-directed rifle-shot would provide. Sending the bullet a few inches under the waiting fish would throw him a yard out of the water, and before he recovered

from the shock he was seized. Neither this species nor the black-bass would take the hook, though ever so temptingly dangled in his very face; but the rifle, used by the botanist of the party as above described, supplied our table with "the best the streams had in stock."

22. *AMBLOPLITES RUPESTRIS*, Rafinesque. (845.)

While this species occurred in the collections in only the West Fork of Black River, Reynolds County, and in Spring Valley Creek and Jack's Fork, Shannon County, it no doubt occurs in every stream in the region traversed.

23. *LEPOMIS MEGALOTIS*, Rafinesque. (864.)

Jack's Fork, Shannon County.

24. *MICROPTERUS DOLOMIEU*, Lacepede. (877.)

This species was very abundant in all the streams visited. In the deeper portions of the clear, large streams, resting near the bottom, and motionless, could sometimes be seen a score or more full-grown specimens. Nothing could induce them to take the hook, nor were they easily alarmed. At this season of the year they appeared to move in schools, and when one was seen others were sure to be found in the immediate neighborhood. This form makes nests by bringing to a single point piles of pebbles and cobblestones, the river bottom, in favorable localities, presenting many such piles. The small-mouthed black-bass is sometimes called "trout" in Southern Missouri, but that name was more often applied to the pickerel, while the name "perch," for this form, appeared to be more commonly employed.

25. *BOLEOSOMA OLMSTEDI OZARCANUM*, Jordan and Gilbert. (885c.)

Jack's Fork, Shannon County, and Big Creek, Texas County. This very beautiful little darter occurred abundantly in Big Creek. It was much more rare at the other locality.

26. *DIPLESION BLENNIOIDES*, Rafinesque. (894.)

Jack's Fork and Sinking Creek, Shannon County; West Fork of Black River, Reynolds County. This species, usually abundant, occurred but rarely in our collections. The range of coloration is exceedingly variable, though green predominates. However, the Sinking Creek specimens presented but a *modicum* of that color, the dominating shade being yellow, with black or greenish-black sparsely-distributed blotches. A single specimen from Jack's Fork is almost entirely black, with hardly a suspicion of green. This specimen, too, was the largest taken, measuring fully five and one-fourth inches.

27. *ETHEOSTOMA PUNCTULATUM*, Agassiz. (933.)

Occurred but once only, in a small stream tributary to Big Creek, in Texas County.

28. *ETHEOSTOMA CERULEUM SPECTABILE*, Agassiz. (936*b*.)

West Fork of Black River, and Barren Creek, Reynolds County; Sinking Creek and Spring Valley Creek, Shannon County, and Big Creek, Texas County. This pretty darter occurred abundantly in each of the above localities. Its favorite haunt appeared to be in the shallow and muddier portions of small brooks and streams, where it found ready refuge under submerged leaves. In such localities it was obtained in the greatest abundance, especially when the lead-line scraped over the bottom, carrying quantities of leaves and other vegetable *debris* into the seine. In its brilliant coloration it presents a most infinite diversity, though many specimens are almost entirely black.

29. *URANIDEA RICHARDSONI*, Agassiz. (1320.)

Abundant in all streams, and especially so in Big Creek, Texas County. The remarks on the coloration of the preceding forms are equally applicable here. It is protective in a high degree, and only the closest scrutiny enables one to distinguish the fish in its native element. There is nothing brilliant in their coloration, but a great variety of sombre hues predominate.

The following species were taken later in the season, in October and November, 1886, in Bear and Hinkson Creeks, two characteristic prairie streams in Boone County, near Columbia. They are introduced here because so little is known concerning, not alone the geographic distribution of Missouri fishes, but also so little concerning what species occur in the State. In these two streams, in this locality, though the bottom is rocky, the water is turbid and sluggish:

1. *CATOSTOMUS TERES*, Mitchell. (170.) Hinkson Creek.
2. *NOTURUS EXILIS*, Nelson. (88.) Hinkson Creek.
3. *CAMPOSTOMA ANOMALUM*, Rafinesque. (196.) Bear and Hinkson Creeks.
4. *LEPOMIS CYANEILLUS*, Rafinesque. (853.) Bear and Hinkson Creeks.
5. *LEPOMIS HUMILIS*, Rafinesque. (868.) Bear Creek; abundant.
6. *BOLEOSOMA OLMSTEDI OZARCANUM*, Jordan and Gilbert. (885*c*.) Bear Creek.

7. *PIMEPHALES NOTATUS*, Rafinesque. (219.) Abundant in Bear Creek.
8. *PIMEPHALES PROMELAS*, Rafinesque. (218.) Bear Creek.
9. *NOTROPIS DELICIOSUS MISSOURIENSIS*, Jordan and Gilbert. (233.) Bear Creek ; abundant.
10. *SEMOTILUS ATROMACULATUS*, Mitchell. (347.) Bear Creek.
11. *PHENACOBUS MIRABILIS SCOPIFER*, Cope. (316.) Bear Creek.
12. *POMOXYS ANNULARIS*, Rafinesque. (842.) Bear Creek ; abundant.
13. *MOXOSTOMA MACROLEPIDOTUM*, L.e Seuer. (185.) Hinkson Creek.

## IOWA THUNDER-STORMS—NOTES FOR THE SUMMER OF 1887.

BY FREDERICK STARR, PH.D.

(*Read before the Academy, December 2d, 1887.*)

THIS report is very faulty. I present it, however, with the hope that the material it contains may not be entirely without value, and that some one, better qualified for the work than I am, may be led to undertake the study for another season.

These notes cover the three months from June 1st to September 1st. In the spring, a circular, with sample blank enclosed, was sent to such persons as I believed would be interested in the work. Favorable replies were received from about seventy persons. More than half of that number have really reported. It can readily be appreciated that so small a number cannot properly report so large an area. It is hoped that a larger corps of workers may be secured for another season. A list of observers who have actually reported follows:

Avey, O. H., Oskaloosa.	Moulton, M. M., Monticello.
Baur, George, Middle River P. O.	Mulford, A. M., New Providence.
Bennett, T. W., Lenox.	Norelius, A., Kiron.
Boyd, Joseph, Oskaloosa.	Olds, H. D., Cedar Rapids.
Brackett, A. G., Denmark.	Payne, Wm. D., Tabor.
Brainard, D. W., Grinnell.	Perkins, C. G., Onawa.
Brown, Caleb, Sac City.	Pratt, W. H., Davenport.
Brown, W. J., Emmetsburg.	Prinelle, H. W., Ft. Dodge.
Coffey, W. T., Marion.	Raymond, H. F., Waterloo.
Collin, Alonzo, Mt. Vernon.	Reeves, M. L., Seney.
Crosby, James O., Garnavillo.	Renfrew, H. N., Bancroft.
Dean, Mrs. Seth, Glenwood.	Rice, Charles, Smithland.
Dysart, Joseph, Dysart.	Rice, Wilbur F., Adair.
Elder, J. M., Concord.	Roberts, Luke, Clinton.
Ellis, G. M., Emmetsburg.	Sawyer, C. N., Orange City.
Hunter, G. F., Hawarden.	Schadt, Conrad, Amana.
Koontz, Alph., Albia.	Sears, P. W., Moravia.
Lahman, V. M., Wiota.	Sheldon, S. G. F., Davenport.
Larrabee, Rachel, McGregor.	Smith, H. D., Monticello.
Lewis, Melissa, Audubon.	Vogeli, Ad., Des Moines.
Marks, T., Hopkinton.	Walton, I. P., Muscatine.
Marshall, Gregory, Cresco.	Ward, William, Algona.
McCready, Miss L. A., Ft. Madison.	Wheeler, I. J., Monona.
Meeker, Roy, Marshalltown.	Winchester, E. D., Stacyville.
Miller, Edwin, Auburn.	Witte, Max E., Mt. Pleasant.
Mitchell, L. E., Brush Creek.	Wood, John A., Rock Branch.
Moore, W. W., Gillett.	Wuest, Peter, Homestead.

To all of these we give hearty thanks.

Not only is the number of reporters inadequate, but the reports are not always exact in the matter of time. This is of great importance, as errors in time records render it impossible to properly combine observations in making up the history of the storm. Some reports are valueless, on account of not being dated. The reports would be of much greater value with temperature observations and barometric readings. New blanks should have spaces for these, although all observers may not be able to make such record.

The circular and blanks were copied after those used by the signal service in 1886. They read as follows:

DAVENPORT ACADEMY OF NATURAL SCIENCES.

THUNDER-STORM OBSERVATIONS IN IOWA.

M——, ———, Iowa.

DEAR SIR: Knowing you to be interested in meteorology, from your being a ——, I address this note to you, asking if you will not undertake to report all thunder-storms occurring at your locality during this season, from June 1 to September 1. Certain suggestions follow. The fuller the report the better, though all the questions absolutely necessary to answer are on the enclosed blank.

Count storms six hours or more apart as different storms.

Note the time of first thunder, last thunder, and loudest thunder.

Note direction from which the storm comes, and that to which it goes.

The "scale" of intensity of storm is: 1. Distant lightning. 2. Distant thunder. 3. Moderate thunder-storm. 4. Heavy thunder-storm. 5. *Heavy*, with high wind. 6. Tornado.

Give length of time of rain.

Catch rain in a pail or can with vertical sides, and measure with rule.

Give particulars as to amount of hail, size and shape of stones, etc. Also time of *its* fall.

Much value attaches to *full* descriptions of clouds. Such reports are very interesting, though not absolutely required.

Scale of force of winds: 0. Calm. 1. Light, moving leaves of trees. 2. Moderate, swaying branches. 3. Brisk, raising dust. 4. High, blowing twigs from ground, swaying trees. 5. Gale, breaking branches, loosening chimney bricks. 6. Tornado, destructive.

Be sure to note every storm heard or seen, even though distant; its direction and time, if nothing more. Give details of lightning strokes.

A sample blank is enclosed. Each is for three storms. When filled, they are to be kept until five have accumulated, or until the end of the month. Then all are to be sent on.

Use "standard" time. Be as exact as may be to the minute. Always date carefully, and indicate morning or afternoon by A. M. and P. M. Always write in the blank the place of observation.

Please let me know at once if you will assist. I enclose card for your reply. Address

PROF. F. STARR,

*Cedar Rapids, Iowa.*

The last obstacle to the best results is found in the fact that the person superintending the work is not a professional meteorologist. He has, however, a great desire to see Iowa thunder-storms carefully studied. He believes it to be a subject that will repay diligent work; and if this report, faulty though it be, may stimulate interest in the study, he will be content.

Three kinds of thunder-storms seem to be reported :

*First.* Storms, well defined, traveling from the west, or a western quarter, toward an eastern quarter. Time records, properly made, supply data for calculating the rate of progress eastward. These are apparently connected with the general atmospheric circulation of the United States, and occur in the southeast quadrant of a "low" area.

*Second.* Heat storms, local in character; not showing a progressive movement; often unaccompanied by any wind; seldom beginning until well on in the afternoon, or in the evening. They accompany extreme hot weather.

*Third.* "Squalls," which are well characterized by Dr. Hinrichs in his "Bulletins" for June and July, 1882. His account has been quoted by others, but may again be copied here for Iowa readers:

"Our Iowa squalls are as serious as any on the ocean; the wind may be destructive, but it is not lifting nor revolving as it is in the tornado. Roughly speaking, the squall may be likened to an extended tornado, having its axis parallel to the ground. Here, in Iowa, it generally bursts upon us from the northwest, following the southeast wind; it rolls over and strikes down upon us, usually with abundant precipitation, and soon is succeeded by the same southeast wind which it so abruptly displaced. \* \* So far as I have studied them, they come down from the northwest, progressing at the rate of twenty to fifty miles an hour. In Northeastern Iowa, the storm has a tendency to bend up, so as to make the squall more nearly from the west. In like manner, in Southwestern Iowa its front bends westward, and hence blows more nearly from the north. The storm front is fierce in its power along a considerable distance — twenty to fifty miles, and more, in its front, along the earth, are struck simultaneously. As the great storm-front moves on, it can be traced for 350 miles from northwest to southeast through our State. It is impossible to confound this storm with the tornado, which is fortunately very restricted in its field, mowing a swath of destruction, generally, in a direction corresponding to the line of the squall storm-front, from a southwesterly toward a northeasterly point. The tornado is narrow, local; the squall at a given

instant reaches a narrow, long, extended belt of land like a tornado track, but this belt of destruction is carried forward with great velocity so as to gradually sweep over a large part of the State. Again, the squall of summer is radically different from the blizzard of winter. The squall comes, reaches us, and after a few minutes leaves us, moving onward in its general course toward the southeast; the blizzard blows for hours, and even days. In the squall, but a limited amount of air comes down from the northwest, a great roll of cold and dense air falls upon us; in the blizzard, the entire atmosphere covering several States is moving as one body toward the southeast."

In June, we had a considerable number of local thunder-storms, but few were marked by great rainfall or electrical disturbance. Local storms are reported for every day except the 1st, 15th, 17th, 22d, 23d, 25th, 27th. Some of these were reported from only one station. In but a few cases can the storms be shown to bear relation to a well-defined "low" area to the northwest. From the 4th to the 9th, the number of reports made show a disturbance the most marked on the 7th. A cluster of storms began on the 11th, culminating on the 13th. On the 18th we have a "squall," followed by storms on the 19th and 20th. The storms of the 20th are the most fully reported of the month. On the 30th, a number of storms are reported.

June 3d, 9:45 A. M., a storm struck Middle River P. O. It was of brief duration, and passed from south to northeast. The lightning was very sharp, and two barns west of Winterset were struck; one of them burned. In the afternoon, thunder-storms occurred through the whole southern border of the State. The rainfall was very small. The storm came from the southwest at all stations.

June 4th and 5th. The isobars on the morning map of the 4th are peculiarly bent, and suggest a feeble depression not represented. This is more marked on the 5th, and it is possible that the storms of those dates are connected with it. The reports of the 5th are the more numerous.

June 7th. The storm of the 7th lies in the southeast quadrant of a well-marked "low." On the 5th we see it forming central over Idaho, Wyoming, and Utah. On the 6th, it has moved to central, over Western Dakota, Nebraska, Northern Colorado, and Wyoming. On the 7th it went east, separating into two small areas, one of which stood over Eastern Dakota and Northern Minnesota, with Iowa to the southeast.

On the 10th there are scattering reports of a morning storm in the

western part of the State. Considerable rain fell—1.83 inches at Smithland, beginning at 11:30 A. M.; 1.62 inches at Rock Branch, beginning at 11:05 A. M. At Albia a little rain fell, beginning at 6:00 A. M., and some at Tabor, beginning at 8:00 A. M. On the 11th, eleven reports show local storms of no great importance. Only two of the reports show wind as high as "2." Many report no wind whatever. Little rain fell, except at Auburn, 2.99 inches; Ft. Dodge, 2.00; Middle River, 2.65. The beginning of rainfall was: Auburn, 8:00 A. M.; Ft. Dodge, 8:00 P. M.; Middle River, 9:15 P. M.

Of the 12th, quite a number of reports are at hand. They show local heat-storms. We have no record of temperatures. Moravia reports 91 degrees at noon. There were some early morning storms, but most of them came between noon and 6:00 P. M. Rainfall began: Smithland, 1:00–2:00 A. M.; Bancroft, 2:00 A. M.; Brush Creek, 10:00 A. M.; Cresco, 10:30 A. M.; Auburn, 12:30 P. M.; Moravia, 12:45 P. M.; Kiron, 1:00 P. M.; Adair, 1:54 P. M.; Tabor, 2:00 P. M.; Algona, 3:00 P. M.; Glenwood, 3:03 P. M.; Middle River, 3:30 P. M.; Smithland, 4:00 P. M.; Concord, 4:00 P. M.; Onawa, 5:25 P. M.; Cresco, 8:30 P. M.; Glenwood, 11:00 P. M. The rainfalls are: Bancroft, 1.50 inches; Cresco, 1.10; Auburn, 0.48; Moravia, 1.00; Kiron, 2.50; Adair, 0.25; Tabor, 0.18; Algona, 1.00; Glenwood, 1.40; Middle River, 0.30; Smithland, 0.73; Concord, 0.90; Onawa, 0.70. The highest wind reported was at Algona—force, "3." Most records show a calm. Glenwood—"Afternoon storm was a sudden down-pour from a local cloud; very little thunder and lightning." Kiron—"Storm came in three distinct showers." This storm was for many places a breaking up of the great drought.

This cluster of storms apparently culminated on the 13th. Twenty-five reports were received of this date. The storms set in a little before noon. Rainfall beginnings are reported from then till 6:00 P. M. These are most numerous between 4:00 and 6:00 P. M. The times are as follows: Albia, 1:00 A. M.; Grinnell, 6:45 A. M.; Amana, 9:25 A. M.; Homestead, 9:42 A. M.; Dysart, 9:10 A. M.; Mt. Vernon, 10:40 A. M.; Monticello, 11:40 A. M.; Smithland, 1:00 P. M.; Mt. Pleasant, 1:15 P. M.; Davenport, 1:25 P. M.; Clinton, 2:00 P. M.; Concord, 3:10 P. M.; Albia, 3:40 P. M.; Tabor, 4:00 P. M.; Cresco, 4:10 P. M.; Bancroft, 4:40 P. M.; Orange City, 4:46 P. M.; Auburn, 5:00 P. M.; Algona, 6:00 P. M.; Cresco, 6:00 P. M.; Albia, 7:15 P. M.; Algona, 12:00 P. M. The amounts of rainfall are: Albia, 0.25 inches; Grinnell, 1.00; Amana, 1.28; Homestead, 0.86; Dysart, 0.10; Mt.

Vernon, 1.35; Monticello, 0.89; Smithland, 0.13; Mt. Pleasant, 0.00; Davenport, 0.53; Clinton, 0.25; Concord, 0.25; Albia, 0.37; Tabor, 0.00; Cresco, 0.37; Bancroft, 0.66; Orange City, 0.25; Auburn, 0.03; Cresco, 0.33; Albia, 0.06; Algona, 0.05. Dysart and Monticello report wind at "4;" Albia, Cresco, and Amana at "3;" others lower; Smithland, "calm." Notes: Concord—"Commenced at *precisely* same time as yesterday." Algona—"For three days have had thunder-storms nearly all time after noon until daylight of next morning. All have passed to northeast." Cresco—"The above storms seem to be a continuation of those of yesterday." Albia—"Magnetic needle 15' east at 8:00 A. M., and 22' east at 9:00 A. M." Mt. Pleasant—"Moderate lightning and thunder. Lightning struck close by, in northeast, at 7:00 P. M. and at 9:20 P. M."

On the 18th, Iowa was in the southeast quadrant of a "low" area over Eastern Dakota and Western Minnesota. This is one of our typical "squalls." Hinrichs reports it as "extending over Northern and Eastern Iowa, locally, with heavy rain, thunder, and lightning." Unfortunately, the time records do not admit of a "portrait" of this storm. A few notes are here given. The day was the hottest of the month. At Brush Creek, the temperature at noon was 102°. Clinton—"Wind gusty, carrying clouds of dust high into the air. Rain began in a dash, and the wind abated soon after rainfall commenced." Cresco—"Storm clouds passing around all the afternoon; some, with much heavier rain than we had, passed both north and south of us." Algona—"Lightning struck frequently from clouds to earth. Four distinct thunder-storms to-day; all formed high up, and went to east. All the thunder-storms thus far in June, *except* that of to-day, were formed near by, high up, and seemed to gather force as they moved northeast; 'pocket clouds,' at 6:00 P. M., passing from southwest to northeast." Ft. Dodge—"Clouds look threatening; pass away with high wind; blue sky at 4:00 P. M." Concord—"Lightning in every point, except, perhaps, southwest; a continuous storm from west and southwest to northwest, north, northeast, east, and southeast; Thomas Jakonbek killed by lightning four miles north of here, at 5:00 P. M." New Providence—"Hail, north and nothwest, breaking small limbs from trees." Orange City—"Team killed, and driver (William Rombough, of Hull) stunned by lightning." Davenport—"About noon, the storm-line of stratus clouds was seen in the northwest, which slowly advanced until the storm broke at 5:45 P. M.; wind furious and broken, but storm did not seem able to pass over to the south, where a strip of blue

sky was visible all the time; ceased at 7:00 P. M., but still in the north, and highly colored by the setting sun; at 8:00 P. M., sharp thunder and lightning in the northwest, but the *storm* did not come until 1:00 A. M. of the 19th, when it was terrific, but without wind; showers continued until 5:00 A. M." Waterloo—"Two storms; the first was heard at 2:10 P. M., the second at 4:15 P. M. The movement was from the north to the southeast; wind quite heavy; storm gathered in the north and extended; very black clouds; very hot before storm; temperature changed suddenly before it rained much; heavy masses of vapor scud across sky very low, going to south." Davenport—"Thunder, 5:40-7:45 P. M., northwest to southeast; heavy dust storm; a second and third installment at 11:50 P. M., and early in morning." Amana—"Six sheep killed at one time, in South Amana." This storm was accompanied by hail: Bancroft, 5:31-5:32 P. M.; Mt. Vernon, "a few drops;" New Providence, "a little, about the middle of the storm;" Concord, 12:40-12:48 P. M.; Ft. Dodge, 2:15-2:30 P. M., "slight;" Marion, 4:30-4:36 P. M.; Grinnell, 4:48-4:55 P. M., "slight." The times of rain beginning are: Smithland, 8:00 A. M.; Orange City, 11:35 A. M.; Bancroft, 12:00 M.; Concord, 12:35 P. M.; Algona, 2:00 P. M.; Ft. Dodge, 2:30 P. M.; Monona, 3:00 P. M.; New Providence, 3:00 P. M.; Emmetsburg, 3:00 P. M.; Brush Creek, 3:00 P. M.; Garnavillo, 3:30 P. M.; Cresco, 3:40 P. M.; Dysart, 4:20 P. M.; Monticello, 4:25 P. M.; Marion, 4:25 P. M.; Amana, 4:35 P. M.; Mt. Vernon, 4:35 P. M.; Homestead, 4:45 P. M.; Grinnell, 4:45 P. M.; Muscatine, 5:30 P. M.; Davenport, 5:52 P. M.; Clinton, 6:00 P. M.; Mt. Pleasant, 6:30 P. M. The distance from Orange City to Davenport is about two hundred and fifty miles; the time taken by the squall to traverse that distance, six hours and twenty minutes; giving a rate of nearly forty miles per hour. The heaviest rainfalls reported are: Brush Creek, 1.10 inches; Garnavillo, 0.70; Dysart, 0.90; Monticello, 0.75; Marion, 1.30; Amana, 1.12; Mt. Vernon, 0.80; Homestead, 0.72; Muscatine, 0.68.

On the 19th and 20th, there were a number of reports. The 21st shows a well-defined "high" area over Wyoming, extending east, and giving the clear, stormless weather of the 21st to the 29th, inclusive.

The storms of the early morning of the 19th ought, perhaps, to be counted with the storm of the 18th. Hawarden, Homestead, and Davenport report a storm from the northwest at midnight, with rain lasting two or three hours. A later storm traveled from Ft. Dodge east and southeast to Grinnell, Amana, and Davenport. The first

thunder was heard at Ft. Dodge at 2:30 A. M., the last at 3:30 A. M.; rain began at 3:00 A. M. Amana—"First thunder at 7:50 A. M., last at 9:50." Davenport—"First thunder at 10:00 A. M.; rain at 10:30 A. M." The heaviest rainfall was at Ft. Dodge—0.50 inch. Hail fell at five and one-half miles southeast of Des Moines. Marshalltown reports "a storm from the south at 4:40 P. M., with 0.48 inch rainfall and high wind."

The 20th is well reported by thirty-six observers—two storms, apparently, one in the forenoon, the other in the afternoon. The rainfall times of storm "A" are: Rock Branch, 12:30 A. M.; Seney, 1:30 A. M.; Orange City, 1:45 A. M.; Wesley Township, 2:00 A. M.; Auburn, 2:00 A. M.; Ft. Dodge, 2:15 A. M.; Concord, 2:45 A. M.; Smithland, 4:00 A. M.; Cresco, 6:00 A. M.; Monona, 6:00 A. M.; Brush Creek, 6:00 A. M.; Dysart, 6:00; (Glenwood, 6:05 A. M.; Tabor, 6:40 A. M.); McGregor, 7:00 A. M.; Monticello, 7:00 A. M.; Mt. Vernon, 7:10 A. M.; Garnavillo, 7:15 A. M.; Marshalltown, 7:30 A. M.; Homestead, 9:23 A. M.; Amana, 9:25 A. M.; Oskaloosa, 10:30 A. M.; Albia, 11:20 A. M.; Moravia, 12:10 P. M. These indicate a well-defined storm moving east or southeast. The distance from Seney to Moravia is about two hundred miles; the time taken, nearly twelve hours; rate of travel, sixteen miles an hour. The wind was generally reported at "2" or "3" in force. Hail fell at Seney from 3:00 A. M. to 3:05 A. M., where this was the "fiercest storm of the season; wind very strong; lightning almost a continual flash all through the storm." At Moravia there was no wind. Storm "B" is reported that evening by several observers coming from the southwest or west and passing east. Rainfall began at Cresco at 3:40 P. M.; at Muscatine at 8:00 P. M. The average duration of rainfall was one hour. The greatest was at Monona: 0.50 inch; Muscatine, 0.47. Notes: Davenport—"Sharp thunder and lightning in north during the evening, but rain did not fall till in night." Cresco felt both the above, and had a third storm at 5:30 P. M.; "Distant thunder continuous throughout the day; cleared off at night after 8:00 P. M.; numerous small showers around all afternoon and evening." Hinrichs reports "men plowing corn killed by lightning, one in Madison County, one in Adams County."

The 30th was stormy in much of the State. We were then in the southeast quadrant of a well-marked "low," central over Dakota on that morning. This area combined later with another area further west. Low pressures to our northwest were fairly prevalent until July 5th, and storms are reported locally until that date.

The storms of the 30th are very local, and apparently without connection. The storms came, generally, from south, southeast, or southwest. The observer at Adair reports "very curious *bursting* and branching out lightning. The storm came from west and south, and was very threatening until nearly at point of observation, then the wind rose and blew as a south wind till the storm was over; it then changed to the northwest and blew for fifteen minutes with force of '4;' at 7:05 P. M. it changed in five minutes to southwest, with force of '4;' after ten or fifteen minutes it changed to east, with force of '2.'"

Hinrichs says of July: "Thunder-storms and rains frequent, but generally very local. The temperature rose gradually from the 11th to the 17th, and from the 26th to the 29th. On these hottest days, heat-storms, with rain, thunder and lightning, and locally high wind and hail, set in, greatly lowering the temperature. Storm of the 17th was most intense in southeastern Iowa; that of the 29th, in northeastern portions of the State."

Storms are reported in July for every date except the 6th, 7th, 15th, 18th, 23d, and 24th.

July 1st. Several local storms, in both forenoon and afternoon. None show well-defined form or progressive movement. Rainfall was heaviest at Monticello — 1.50 inches.

July 2d. Storms local — heat-storms. Out of seventeen reports, only one gives a wind as hard as force "3;" some *report* "no wind at all." Greatest rainfall at Clinton — 0.59 inch. Moravia — "Revolving clouds, rolling in every direction; upper strata white; lower strata dense."

July 3d. A fairly defined storm seems to have passed across the State from the southwest. Times of beginning of rainfall are: Tabor, 3:00 A. M.; Bancroft, 6:30 A. M.; Oskaloosa, 10:00 A. M.; Cedar Rapids, 11:45 A. M.; Amana, 11:50 A. M.; Homestead, 11:55 A. M.; Mt. Vernon, 12:50 P. M.; Hopkinton, 1:00 P. M.; Monticello, 1:20 P. M.; Cresco, 1:30 P. M.; Brush Creek, 1:40 P. M.; Monona, 2:30 P. M.; McGregor, 2:45 P. M. From Tabor to McGregor is about two hundred and seventy miles; time of passage by storm, eleven hours and twenty minutes; rate of travel, thirty-five miles per hour. There was *no* wind at Tabor; wind seems to have blown more and more as the storm passed to the northeast. At Brush Creek, Monona, and McGregor it is reported "high;" at Cedar Rapids, force "4." The rainfall varied. Tabor and Monona report over one inch; Amana, only 0.20 inch. Brush Creek reports "clouds very black; gale of wind, with slight hail, at 1:40 P. M.; storm went around to north and northeast very heavy; rain at 1:40 P. M. — 0.60 inch in ten minutes."

July 5th. A storm from the southwest and northwest passed to east. Time records vary. Hail fell. Tabor—"Hail small, doing little damage." Rock Branch—2:40 to 2:45 P. M.—"Little; hail did some damage to crops south and southwest of here, about three miles." Kiron—"Hail fell southeast and northeast; some damage to crops." These storms, whose beginnings cover time from 2:00 to 9:00 P. M., were accompanied by some wind, as at Albia and in the hail district.

The freedom from storms of the 6th and 7th was broken on the 8th. The "weather map" of that forenoon shows a "low" area to our northwest, over Dakota and Minnesota. Its influence is seen in the number of reports for that date. Two or three storms apparently occurred. Lenox reports: "8:30 P. M., lightning and thunder in southwest and northeast began simultaneously; clouds approached each other in southeast and then scattered; no rain here, but some eight miles south." Concord—"Several head of cattle and one colt killed by lightning." Monticello—"Considerable sheet-lightning."

July 9th. Apparently local storms, with considerable lightning. Davenport reports "ice-house struck and burned at Rock Island city, and smoke-stack of wagon factory struck at Moline, between 1:00 and 2:00 A. M." Moravia—"Four flashes of lightning approached the earth; one struck a fence-post, the other three killed ten head of cattle; six of these lay on the wires in one place, the others were twenty rods distant."

On the 10th but a single report is made. The weather map of this forenoon shows an area of "low" in Dakota. This worked to the southeast. On the 11th, the well-defined "low" area was in the northwest corner of Iowa. A number of *night* storms are reported on the 11th. These all came from the west quarter, and were accompanied by considerable wind in some cases. The rain beginnings were all between 6:00 P. M. and midnight. Reports say: Auburn—"First really severe thunder-storm of season; storms mostly at night." Algona—"Very heavy thunder and lightning." Cresco—"Distant lightning all around horizon after 9:00 P. M.; bulk of storm seemed to be in the north; temperature at 9:00 P. M., 82°, and at 2:00 P. M., 97°, being the hottest of the year."

July 12th. Night storms again from a western quarter. The rain beginnings are mostly between 6:00 and 8:00 P. M. *All* the reports fall between 2:00 P. M. and midnight. This storm was fairly defined, and comparison of rainfall times shows an apparent east and northeast movement, though there are some discordant times. The "agreements" are: Des Moines, 4:15 P. M.; Cedar Rapids, 4:00 P. M.; Marshall-

town, 5:30 P. M.; Hopkinton, 6:00 P. M.; Dysart, 6:00 P. M.; Homestead, 6:20 P. M.; Amana, 6:25 P. M.; Oskaloosa, 6:20 P. M.; Albia, 6:40 P. M.; Monticello, 7:30 P. M.; Brush Creek, 7:30 P. M.; Mt. Vernon, 8:45 P. M. Time from Des Moines to Mt. Vernon, four and one-half hours; distance, one hundred miles; rate of travel, twenty-two miles per hour. Wind was highest at Cedar Rapids, force "5;" Amana, Homestead, Oskaloosa, and Brush Creek report force at "4;" at *most* localities it was "2." The heaviest rainfall was 0.55 inch, at Hopkinton. A little hail fell at Amana and Homestead. At Amana "one horse and two foals killed by lightning, about one mile southwest of observer; they were found lying partly on barb-wire fence. Lightning also struck one house and two trees, in different localities around here. It was the most terrific and appalling thunder-storm we have had for years." Albia—"This afternoon at 4:22 the magnetic needle vibrating from 8' east to 3' west; motion kept up for ten minutes." Cedar Rapids—"Two buildings struck, not badly damaged."

Nineteen reports for the 13th show storms, very local in character, beginning mainly between 2:00 and 8:00 P. M. Very little rain, and no hail. No damage by lightning reported.

But one report on the 14th, and none on the 15th.

July 16th. Twenty-two reports received. Fourteen of these report rain, the rest are thunder and lightning at a distance. These storms were mainly in the western and northwestern counties. They came on in the early evening. Eleven of the fourteen rainfalls began between 4:00 and 10:00 P. M. At some points two storms occurred, but the thunder kept up between; so at Concord. Cresco reports "distant lightning all along the west, after 7:30 P. M., with distant thunder at intervals; the hottest day of the year—98° at 2:00 P. M., 84° at 9:00 P. M. Ordinary years, such a heat would be followed by a severe storm." (This came before daybreak.)

July 19th. Twenty-eight reports refer to this storm in southeastern Iowa. Rainfall beginnings were from 2:00 P. M. to midnight, mostly between 6:00 and 10:00, fifteen reports falling within those hours. The rainfall times are: Moravia, 5:50 P. M.; Cedar Rapids, 6:00 P. M.; Oskaloosa, 6:10 P. M.; Albia, 6:45 P. M.; Amana, 6:45 P. M.; Des Moines, 6:50 P. M.; Homestead, 6:40 P. M.; Mt. Vernon, 7:00 P. M.; Hopkinton, 8:00 P. M.; Dysart, 8:00 P. M.; Brush Creek, 8:30 P. M.; Monticello, 9:15 P. M.; Mt. Pleasant, 9:30 P. M.; Cresco, 9:30 P. M.; Monona, 10:00 P. M.; McGregor, 11:00 P. M.; Garnaville, 11:00 P. M.; Denmark, 10:30 P. M. The heaviest falls are:

Des Moines, 2.00 inches; Homestead, 1.70; Monona, 1.50. Generally, the wind was high. Davenport (see extract below); Oskaloosa, "4;" Amana, "5;" Homestead, "5;" Brush Creek, "4;" Monticello, "5;" Mt. Pleasant, "3;" Cresco, "4;" Garnavillo, "4;" Denmark, "3." This storm was a local heat-storm. For several days the heat had been intense. Moravia reports "104°, 105°, 106°, 99°, 98° for two-o'clock observations, for several days." McGregor—"98° at noon of 16th, 84° at noon of 17th." The heat at Davenport had been so great as to lead to prayer for rain and cooler weather, in the Episcopal Cathedral. A little hail is reported at Amana and Homestead; small fall at Des Moines, 7:40 to 7:45 P. M.; considerable in vicinity of Davenport. Garnavillo reports: "Barometer fell on 16th 0.12 inch, on 17th none. Clouds came from southwest up against and over the lower wind current." Monona—"Brilliant display of lightning from 9:00 P. M. till after midnight; clouds appeared to gather from all directions; heavy thunder during night." Dysart—"Most brilliant lightning display in the south, extending one-third around horizon, seen here since the Grinnell storm; rain, only a sprinkle." Amana—"Four foals killed by lightning at High Amana, four miles west; found dead at barb-wire fence."

*Davenport Democrat-Gazette:* "The rain of yesterday and last night extended this time over the whole of Scott County. The storm of yesterday was accompanied by a wind that played havoc with grain-stacks, trees, and stock-sheds in various parts of the county. Barley and wheat stacks were tossed upon each other in places, and straw was scattered everywhere. Cherry and apple trees along Duck Creek were taken up by the wind and carried fifteen rods, some farther. Nor did wind alone do damage. Out in the direction of Mt. Joy, hail played a prominent part in the storm. The hail that fell ranged in size from a hazel-nut to a hickory-nut, and there were exceptional cases where they were as large as eggs. Mr. Fritz Rohlf, a farmer near Mt. Joy, stated this morning that he had ninety acres of oats which he intended to begin harvesting to-day, and the hail of yesterday stripped his oat-field most effectually. Such was the case wherever it hailed. There was but little hail in the direction of Muscatine County, but in portions of the northern part of this county a great deal of hail fell. The wind blew down fields of corn and leveled grain in the field very much. Hilly farm land was badly washed by the driving rain."

July 19th. A few reports show storms in the western part of the

State. Seney reports "very fierce flashes from 7:00 to 9:00 P. M." Kiron—"Lightning struck and killed a heifer, three miles northeast from here."

July 20th. The "weather map" shows a "low" central over Iowa, moving east, on that day. Local storms are reported from 2:00 to 8:00 P. M. Middle River reports "lightning at 2:30 P. M.; struck in a grain-field, raising a dust cloud."

July 21st. Local storms, mainly in the northwest part of the State, where the weather had been hot. Nearly all were early evening storms, rainfall beginning, in fifteen cases out of sixteen, between 2:00 and 10:00 P. M. Algona—"This storm formed high up; temperature at 12:00 noon, dry bulb, 86°, wet bulb, 83°; wind southwest."

July 22d to 27th. Only four reports for the whole period. The "weather map" of the 26th shows a well-defined little oval area of "low" overlapping the corners of Iowa, Dakota, and Nebraska. Hail, doing some damage to corn, is reported at Rock Branch. This place lies to the southeast from this area. While this "low" was well-defined, it did not last on into the 27th, but was dissipated.

On the 27th we have setting in a cluster of storms which culminate on the 29th. Eighteen reports are upon the storms of the 27th. Several refer to a morning storm in Northwestern Iowa. Rainfall times are: Seney, 2:00 A. M.; Auburn, "very early;" Kiron, 4:00 A. M.; Algona, 4:00 A. M.; Onawa, 4:00 A. M.; Bancroft, 4:10 A. M.; Smithland, 5:00 A. M.; Ft. Dodge, 5:30 A. M.; Concord, 6:00 A. M.; Emmetsburg, 8:45 A. M. At Seney, "hail fell from 2:15 to 2:25 A. M., half an inch deep—no serious damage; lightning very fierce through entire storm; rainfall, 3 inches(?)." Smithland—"Two cows killed, one mile east. Emmetsburg—"Lightning continued sharp during the rain, and seemed to extend all over. The clouds came from the southwest and northwest, and met west of here, *not* over here." Five scattering reports from diverse parts of the State relate to evening storms. Clinton reports 0.18 inch hail falling between 6:04 and 7:00 P. M. Is not *rain* meant?

July 28th. Twenty-five reports. Local heat-storms. Rainfall began in all cases between 10:00 A. M. and 8:00 P. M. At Concord and Albia, two, and at Cresco three, storms are reported, in the day. All these, however, began within the above time limits. No hail is reported. Concord reports, "from an elevated explosion, a wire clothes-line in Garner was melted asunder; several persons shocked." Oskaloosa—"Crabill killed by lightning; two horses killed; barn burned."

Rainfall generally *very* small. At Cresco 0.62 inch fell, and at Monticello, nearly an inch.

July 29th. Heat culminated. Storms occur very early in the morning, perhaps continuation of the last. Evening storm began between 6:00 and 10:00 P. M. This was one of the worst storms of the season. Albia reports: "Barometer falling this afternoon; thermometer 101½° at 3:00 o'clock, 101° at 2:00 o'clock, and 97° at 6:00 o'clock P. M." We were to the southeast of a long "low" area over Dakota and Nebraska on the morning of the 29th. This passed over Iowa during the twenty-four hours following, and was to our east on the 30th. Notes: Seney—"Lightning very fierce; struck an elevator here, and knocked down and badly injured three workmen, at 2:00 P. M.; storming, off and on, all day; no wind." Smithland—"Tree on river bank, forty rods east, struck by lightning." Marion—"One inch rain; southwest wind, '4.'" Algona—"House struck." Concord—"One cow killed, fifteen miles southwest; three horses and two cattle killed for George Clark, in Erin township; hard to describe storm; the severest we have had, in wind, thunder and lightning; from commencement, at 3:30 P. M., to 11:00 P. M., thunder could be heard at some point; lightning continuous, and in all points; storm severest at 8:00 P. M.; rain at 3:30, 7:30, and 9:00 P. M.; hot wind at 6:00 P. M.; and before the last rain, the clouds, coming from the southwest, were upper clouds." Cresco—"Frequent and vivid lightning all evening, in all directions, with occasional showers, until after midnight; very warm and close before storm; a severe squall from west-northwest at 6:10 P. M., accompanying first heavy rain, injuring wind-mills, tearing trees, etc." Algona—"Second storm of day; worst of season; at 6:30 P. M., terrific thunder and lightning; storm went southeast, with a great roar; wind like a gale." McGregor—"Very vivid lightning in the evening; wind changed from southwest to northwest before the storm, being blown rapidly across the sky; wind force, '4.'" Emmetsburg—"Clouds came up from southwest and northwest, very black; seemed to roll until they came together, then changed to light, smoky color, and looked like tornado; only a puff, however; the blackness gave way to light, and settled down to a steady rain; when the two storms came together there was a fearful commotion; it was a pretty sight." Algona—"Third storm of the 29th, 9:00 P. M.; this has been an electrical day; thunder all day; though not six hours apart, these are three distinct storms; all the storms this year come from southwest; this is strange, and never noticed here before during eighteen years." Cresco, Brush Creek, and

Monona report wind force as "5." Rainfall is: Monticello, 0.87 inch; Middle River, 0.20; Marion, 1.00; Concord, 1.10; Cresco, 0.27; Brush Creek, 0.60; Monona, 1.25; Kiron, 1.50; McGregor, 1.08; Ft. Dodge, 1.00; Emmetsburg, 2.50; Algona, 0.55; Garnavillo, 0.75.

This storm continued on into the early morning of the 30th. Rainfall beginnings are reported as follows: Dysart, 12:25 A. M.; Homestead, 2:30 A. M.; Amana, 3:00 A. M.; Cedar Rapids, 3:15 A. M.; Albia, 3:15 A. M.; Monticello, 3:30 A. M.; Mt. Pleasant, 5:40 A. M. Perhaps the average rainfall was 0.50 inch. Dysart—"6:00 to 11:00 P. M. of 29th, very vivid lightning in the north; no thunder till 1:10 A. M.; four or five columns of electricity seemed to extend vertically to the earth from the motionless clouds that hung there for four hours."

In August there are not so many reports as in June and July. Storms are reported for each day, except the 6th, 24th, 26th, and 28th, but on many days there is but a single report. A storm-cluster occurs on the 3d to the 5th, most marked on the 3d; another on the 8th to the 10th, culminating on the 10th. The 13th is fully reported. On the 16th we have several reports, and many on the 17th. A group of storms occurred on the 19th to the 21st, most reports being received on the 20th.

Prof. Hinrichs reports: "Thunder-storms nearly as numerous as rain-storms during first half of month, but rare during the last—cold decade. Much damage done to property and cattle by lightning, and several people killed. High locally destructive winds accompanied the thunder-storms of the 10th and 13th. Hail is reported only on the 3d, in Hancock, and very light on the 8th, in Osceola County."

Examination of the daily weather map of the United States Signal Service shows connection with the general atmospheric movements as follows: On the 3d we were to the southeast of a "low" overlapping the corners of Dakota and Montana. This traveled east, and on the 4th was past us on the north. On the 5th, a well-marked "high" area lay to our west; on the 6th it was over Iowa. No storms on that date. On the 10th, a long, oval "low" area lay to our northwest, extending from Colorado to Minnesota, and overlapping our northwestern corner. August 13th, a well-defined small "low" area was in Dakota and Nebraska, and on our extreme northwestern corner. This moved across Iowa during the following twenty-four hours. On the 17th, a storm gathered in a "low" center near St. Louis, Missouri. Can our storms have been affected by it? On the 20th and 21st, "low" areas lay to the west and southwest. That of the 21st was on the corner of the

Indian Territory, Texas, and Arkansas. It was elongated far to the northeast, and apparently controlled the weather in *that* direction.

August 3d. Scarcely any wind in storms of this date. At Albia and Concord a force of "3" is reported; at Davenport, "5;" at all other places "2" is the highest; many are "1." Some report "calm." Most observers report less than 0.20 inch rainfall. Marion, however, gives 1.00 inch, and Clinton 0.87. Times of rain beginning are: Concord, 9:45 A. M.; Stacyville, 10:15 A. M.; Algona, 11:00 A. M.; Cresco, 11:45 A. M.; Homestead, 12:48 P. M.; Amana, 1:00 P. M.; McGregor, 2:00 P. M.; Dysart, 2:10 P. M.; Marion, 2:15 P. M.; Oskaloosa, 3:00 P. M.; Davenport, 4:08 P. M.; Des Moines, 4:25 P. M.; Monticello, 4:50 P. M.; Clinton, 5:00 P. M.; Albia, 5:45 P. M.; Algona (second storm), 8:50 P. M.; Concord (second storm), 10:00 P. M. Hail fell at Concord, for less than a minute, at 10:00 A. M. The day was very hot. Algona—"Weather very sultry; wet and dry bulbs only 3° apart; temperature at noon, 93°; this afternoon it is very difficult to work—so sultry." McGregor—"Thermometer at 92° at noon." Dysart—"Two storms were seen gathering at 12:00 M.; the one in southwest, the other in the northwest; they seemed to meet here, or, rather, their extremities did, after main bodies of cloud had passed to the east." Clinton—"Lightning fired a barn in Lyons, at 6:00 P. M.; also one a half mile south of Low Moor.

The observer at Dysart, where a storm came from the southwest, with rainfall beginning at 1:30 A. M. on the 5th, remarks: "Storms that strike us in full force first appear *directly* in the west; rain came down very gently; the retreating cloud was visible until 6:00 A. M."

August 8th. Only four reports of rainfall, though several of distant thunder and lightning. These four are from the same section—reports coming from Algona, Concord, Bancroft, and Emmetsburg. The rainfall began: Emmetsburg, 11:30 A. M.; Algona, 6:00 P. M., and again at 11:30 P. M.; Concord, 8:30 P. M., and again at midnight; Bancroft, 11:30 P. M. High winds are reported at Emmetsburg and Bancroft; little or none at other localities. Hail is reported at Emmetsburg at 6:30 P. M., and at Bancroft at 11:30 P. M. At Bancroft—"Showers passing from 6:00 P. M. till midnight." Algona—"Lightning all night; thunder heavy; storm after storm, all night." Concord—"Two storms, at 8:30 P. M. and midnight; also a continuous storm of thunder and lightning until 2:00 A. M. of the 9th; about midnight, the German M. E. Church, in German township, was struck and badly injured; steeple demolished, and floors and other portions somewhat

injured—the worst I ever saw in a building; a meteoric display at midnight, with heavy explosion." Bancroft—"Temperature, 7:00 A. M., 73°; 2:00 P. M., 90°; 9:00 P. M., 74°; mean barometer, 29.90 inches; mean temperature, 77.7°." At Cresco, "rain began to fall at 3:30 A. M. of 9th—only 0.09 inch fell; distant lightning, from northwest to east-northeast, all the evening, from 8:00 P. M. to 11:00 P. M., and later; at 3:20 A. M., storm remarkable for the suddenness and intensity of electricity; very vivid lightning, and roar after roar of thunder, with deafening crash."

August 10, a day of great heat. Cresco reports it "the warmest day of the year. At 2:20 P. M., just before the storm-cloud, it was 101° in the shade (the hottest since 1874, *then* 102°)." Brush Creek—"Gale from south all afternoon, with mercury at 104° at 2:30 P. M., and 100° at 5:00 P. M." This storm, a violent one, seems to have been chiefly confined to the east central part of the State. The beginnings of rainfall are as follows: Cresco, 3:15 P. M.; McGregor, 5:30 P. M.; Brush Creek, 5:30 P. M.; Monona, 5:45 P. M.; Garnavillo, 6:15 P. M.; Cresco (second storm), 6:15 P. M.; Hopkinton, 7:00 P. M.; Des Moines, 7:30 P. M.; Monticello, 8:00 P. M.; Marion, 8:10 P. M.; Cedar Rapids, 8:45 P. M.; Amana, 8:45 P. M.; Homestead, 8:50 P. M.; Oskaloosa, 9:15 P. M.; Clinton, 10:00 P. M.; Albia, 10:00 P. M.; Mt. Pleasant, 11:30 P. M. This storm came from the northwest, and apparently traveled at the rate of eighteen miles an hour. Notes: McGregor—"Strokes at 6:30 P. M. and at 10:00 P. M.; several buildings struck within a few miles." Garnavillo—"Lightning struck telephone pole in front of house." Wind was heavy almost everywhere; "4" is the common report. At Oskaloosa, "tops of haystacks blown off and limbs of trees broken; the only storm of the summer to do any damage." Garnavillo—"Strong south wind all day; 5:30 P. M. it changed to northeast, then west; the rain came without violence; wind west during most of rains." Brush Creek—"Gale from west and northwest; gale from south all afternoon." Heavy rainfalls are reported from some stations: McGregor, 3.27 inches; Monona, 1.62; Hopkinton, 2.30; Monticello, 1.41; Clinton, 1.50. This becomes lighter, or even a "few drops" in the more southern localities.

August 12th. Reports from Emmetsburg, Smithland, Kiron, Ouawa, Rock Branch, and Tabor show a storm in the western part of the State on the evening of the 12th. Time reports continue on into the 13th. There is not sufficient agreement between them all to prove a well-defined eastward-moving storm. They may be grouped so as to show several local storms, perhaps. The time records are: Smithland, 7:00

P. M.; Rock Branch, 8:40 P. M.; Onawa, 9:15 P. M.; Emmetsburg, night; Concord, 7:00 P. M.; Tabor, 4:30 A. M. of the 13th; Monona, before daylight; Bancroft, night; Stacyville, 5:00 A. M.; Ft. Madison, 6:30 A. M.; Davenport, 10:40 A. M.; Hopkinton, 11:00 A. M.; Clinton, 11:30 A. M.; Mt. Pleasant, 1:00 P. M., 13th; Albia, 1:45 P. M.; Brush Creek, 3:40 P. M.; Mt. Pleasant (second storm), 6:30 P. M.; Middle River, 7:20 P. M.; Cedar Rapids, 8:50 P. M. There was little wind. Ft. Madison reports "6" (?); Emmetsburg, Concord, and Bancroft report "3." "Lightning struck barn near Denmark, burning it with all its contents."

August 17th. A few local storms. One in northeastern Iowa is reported as beginning at Stacyville at 11:35 A. M.; Cresco, 12:00 M.; Brush Creek, 2:00 P. M. Reports from Middle River, 11:40 A. M.; Des Moines, 2:20 P. M.; Dysart, 2:33 P. M.; Monticello, 4:00 P. M.; Amana, 4:20 P. M.; Homestead, 4:40 P. M., and Davenport, 5:55 P. M., harmonize fairly. Notes: Davenport—"Dust-storm, then calm." Dysart—"Sometimes thunder-clouds rise fairly in the west, and then divide, one portion swinging down Wolf Creek, and the other off to Iowa River."

August 19th. Reports inharmonious. In the early morning, at Ft. Dodge and Auburn, a storm is reported. Most, however, began in the evening and night, and some continued on into the 20th. There is a storm in the early morning of the 20th, between midnight and 6:00 o'clock, reported from nearly every part of the State. Wind at Ft. Dodge and Kiron, with force of "4;" at Smithland and Onawa, "3;" in all other parts of the State, light. Very little rainfall anywhere—0.50 inch at Kiron, 0.25 at Ft. Dodge, 0.23 at Smithland, and 0.15 at Onawa, being the heaviest. Afternoon and night storms are reported from four scattered stations. At Bancroft, "two persons riding on a horse-rake were killed by lightning at 2:30 P. M."

In concluding this very imperfect report, I may call attention to a few facts shown by the above:

*First.* In Iowa we have at least three well-defined varieties of summer thunder-storms.

*Second.* Our "heat-storms" generally come between 4:00 P. M. and midnight, but often have a *later* installment, which comes in the early morning.

*Third.* Local thunder-storms this year show very little wind. Frequently a calm may accompany a storm of some severity.

*Fourth.* The rainfall in many of these storms was remarkably light.

*Fifth.* There has been very little hail this year. Small amounts fell on June 18th, 19th, 20th, July 3d, 5th, 26th, 27th, August 3d and 8th.

*Sixth.* When our thunder-storms and hail show any connection with the "low" areas of the United States Signal Service weather map, we are generally in the southeast quadrant of such an area, and at a considerable distance from the center.

*Seventh.* Three cases are mentioned of dead horses found at the barbed-wire fence. I would like reference to similar cases elsewhere.

## A DESCRIPTION OF THE ROCKFORD SHALES OF IOWA.

BY CLEMENT L. WEBSTER, STATE UNIVERSITY OF IOWA.

*(Read before the Academy, April 20, 1887.)*

Of the Devonian rocks of Iowa—and I might, perhaps, venture to say, the United States—there is no division more interesting to the paleontologist than the Rockford shales. The great variety and beautiful preservation of the fossil species contained in them, throw much light upon the history of the latter part of the Devonian age, in the northern part of Iowa.

It is a significant fact that many of the fossil species contained in the shales approach more nearly the European forms than do the forms from the same horizon in other portions of America. Some of the species, however, are peculiar to the shales, not being found, so far as is at present known, in the strata of any other portion of the world; and the fact that these beds contain some species whose extreme western limit of distribution was heretofore believed to be hundreds of miles to the east, contributes to their interest.

In this paper I have given, for the most part, only a general description of the strata which underlie the shales, in order that their relation to the shales may be understood.

The area of the shales is represented on the accompanying map. Whether they extend north of the limit indicated on the map, I am unable to say, as the surface is here everywhere so deeply covered by the drift that no exposure of the underlying strata is to be observed; and during the Quaternary period, they were considerably acted upon by the moving ice—so much so, indeed, that over limited areas they were removed nearly or quite down to the underlying strata. The accompanying map shows also the distribution of organic remains in the Devonian rocks underlying the shales.

The lithological characters, as well as the thickness of this formation, are somewhat varied in different portions of its area.

At Rockford and Hackberry, it attains a thickness of from twenty-five to forty-five feet, and is made up of thin-bedded, friable, very argillaceous limestones, varying in color from a light buff to a dark brown, which disintegrate very readily, forming a hard, dark yellow or buff-

colored clay, which, at Hackberry, contains numerous hard, dark red, ferruginous concretions, varying in diameter from one to four inches. The lowest twenty-five feet of the forty-five foot stratum at Hackberry is blue clay, which is mostly covered by a layer of shales.

On Flood Creek, at Rudd, in Floyd County, the shales are well exposed for a short distance in the east bank. Here the following section was taken:

1. Drift and detritus ..... 2 feet.
  2. Yellowish brown (sometimes shaly), thin-bedded limestone, containing several species of corals, *Stromatopora*, *Spirifera*, etc., which are not known to occur in the shales at any other place, but which are more or less common in the limestone in other portions of the State..... 4 feet.
  3. Yellowish brown, argillaceous, shaly limestone, containing some sand, and numerous species of fossils, as *P. woodmani*, *O. iowensis*, *Luxonema*, *A. reticularis*, etc., and weathering to a yellow clay. This division passes imperceptibly into No. 2..... 5 feet.
  4. Grayish-buff limestone, made up almost entirely of concretions of a harder and darker material, and containing numerous *Lamellibranchiata* (none of which are known to occur in the shales), with a few specimens of *P. woodmani* and *O. iowensis* at the top, to the bed of the creek.....  $9\frac{1}{2}$  feet.
- Total..... $20\frac{1}{2}$  feet.

In the bed of the creek, about one-half mile below the above locality, a small quarry has been opened in limestone immediately below number 4. Here measurements gave the following results:

1. Yellowish-buff, thin-bedded limestone..... 3 feet.
2. Thicker bedded, grayish-blue limestone..... 3 "

Both divisions contain the same assemblage of fossils, most of which are *Brachiopoda*. Only one or two of the species occurring in these beds are known to extend upward into the higher beds.

In the west bank of this creek, three miles south of the above locality, the shales are again observed. The beds here attain a thickness, by estimate, of about nine feet, and are made up of thin-bedded, somewhat friable, brownish-yellow, calcareous and argillaceous limestones, which contain an abundance of *Fistulipora occidentis* (?).

Underlying the shales is a nine-foot stratum (not well exposed) of limestone, which is apparently the equivalent of the concretionary limestone of the Rudd section.

In the extreme south-western part of Floyd County, and the south-eastern portion of Cerro Gordo County, the shales are much thinner,

and are less argillaceous than those portions of the beds which are exposed at Rockford and Hackberry. The fossils in this region are very abundant and finely preserved. The species *Naticopsis gigantea* attains a somewhat larger size and is more abundant than in some other portions of these beds.

On a small creek, at Owen's Grove, in Cerro Gordo County, the annexed section was taken :

1. Drift and detritus (sloping surface, probably concealing several feet of shaly limestone), by estimate.....17 feet.
2. Soft, dark buff, somewhat argillaceous shaly limestone. 7 "
3. Blue shaly limestone, containing concretions..... 2½ "

Total.....26½ feet.

About one-eighth of a mile south-west from this locality, on the same creek, is another limited exposure of the shales, which differ in some particulars from those exposed at any other locality, in that they weather to a rather soft, yellowish-white clay, and contain numerous *Lamellibranchiata* and *Gasteropoda* not known to occur in other portions of the beds.

Six miles east of Clear Lake, the shales are seen to outcrop on Willow Creek. They are here somewhat thicker bedded than usual, and vary from a dark buff to a dark brown color; they vary, also, from their equivalents previously described, at other localities, in being slightly sandy. The fossils are not numerous, and nearly all occur in the form of casts.

Two miles east of Clear Lake, the shales are observed as an outlier in a gently undulating prairie region, and present the same paleontological and lithological character (except that they are somewhat more friable) as at the exposure on Willow Creek.

Three miles west of Mason City, in the west bank of Willow Creek, the shales are again finely exposed, and at this locality the following measurements, by estimate, were taken :

1. Drift..... 1 foot.
2. Thin bedded, shaly, argillaceous limestone, containing some sand and casts of fossils, decomposing readily on exposure.....20 feet.
3. Hard, stiff blue clay, containing numerous concretions of harder material.....12 "

Total.....33 feet.

The fossils contained in the shales at this place are comparatively rare, and occur only in the form of poorly preserved casts.

Over this portion of the area occupied by the shales, the deposition seems to have been more rapid than at other localities, and less well adapted to the preservation of the forms imbedded in it; and, inferring from the rarity of even the casts, the conditions would seem to have been less favorable to the existence of life.

The blue clay at this locality, as will be observed, occupies the same position relative to the shales as the blue clay at Rockford, hereafter to be spoken of.

The condition and thickness of the shales in Worth County is difficult, if not impossible, to determine, owing to the unusual depth of the drift deposit which everywhere occupies the surface. It has been reported to me, however, from an apparently reliable source, that the shales are well exposed at a locality some miles south-west from Northwood, in Worth County. I have not personally visited this locality.

That the relation of the shales and their contained fauna to the subjacent strata and its fauna may be better understood, I here give a general outline of that portion of the underlying beds which are included within the area mapped. The shales everywhere occupy the higher position, being overlaid by no rocks older than the Cretaceous.

The following section, taken at Rockford (in part compiled from Hall's Geological Survey of Iowa, Vol. I., Part I., page 309), will show the relation which these beds sustain to the underlying strata at this place:

1. Drift, etc. ....	5 feet.
2. Decomposing argillaceous shaly limestone, containing an abundance of beautifully preserved fossils. ....	25 "
3. Stiff dark blue clay, devoid of fossils. ....	20 "
4. A gently inclined surface, mostly unexposed, with buff and white striped shaly limestone at base. ....	43 ft. 10 in.
5. Unexposed. ....	2 feet.
6. Dark colored hard limestone. ....	2 "
7. White pure limestone, with shaly structure (usually very fine grained and brittle, and in places made up almost entirely of <i>Stromatopora</i> ). ....	5 ft. 6 in.
8. Hard buff calcareo-silicious sandstone, containing an abundance of <i>Streptorhynchus chemungensis</i> and <i>Spirifera disjuncta</i> , which occur in the form of casts, and all lying with a particular portion of the shell upward. ....	3 feet.
9. Rather soft ash-colored calcareo-silicious sandstone, containing casts of fossils*. ....	2 "
10. Somewhat arenaceous thin-bedded limestone. ....	3 "
11. Beds not exposed down to the level of Lime Creek. .	3 "
Entire elevation. ....	114 ft. 4 in.

\* Three miles south of Rockford, the beds Nos. 8 and 9 are seen to outcrop in the north bank.

A Marble Rock, the limestone beneath the shales is well exposed in the bank of the Shell Rock, with a thickness of ten to fifteen feet or more, and is, for the most part, a rather thick-bedded, hard and fine-grained brittle limestone, varying from nearly white to dark brown in color, with scarcely a trace of fossils.

The rocks which underlie the shales adjacent to Rudd are thin-bedded, fine grained and brittle limestones, varying in color from nearly white to dark gray, and almost devoid of organic remains.

About one mile below Charles City, in the eastern part of the county, the beds below the shales are well exposed at the "Marble Quarries" in the east bank of the Cedar River. The banks here rise to a height of about forty or fifty feet above the water in the river. The upper five or six feet is made up of rather thin-bedded, compact (sometimes brittle and crystalline) yellowish-gray limestone. The remaining portion of the outcrop is composed of hard, thicker-bedded, yellow or grayish-brown limestone (and sun-cracked shales), which is literally crowded with *Stromatopora*, and a few species of the more common *Brachiopoda*.\* At this locality is quarried the rock from which the "Charles City Marble" is manufactured; the rock, as well as the masses of *Stromatopora*, taking a fine polish.

On the west side of the river, one mile above Charles City, there is an exposure of about ten feet of very hard, fine-grained and brittle limestone, with a more or less perfect conchoidal fracture. The layers vary in thickness from five to thirteen inches, and resemble each other so closely that they can hardly be distinguished in hand specimens, especially as all are unfossiliferous.

At numerous localities along the Cedar, for a distance of sixteen miles above Charles City, the limestone is well exposed, but as it approaches so nearly, in lithological characters and absence of fossils, that of the last section, detailed description is unnecessary.†

On the Cedar River in Mitchell County, the rocks beneath the shales are well exposed about one and a half miles west of Osage, the exposures ranging from forty to more than one hundred feet. The layers

of Beaver Creek, and, so far as could be observed, reach a thickness of only one or two feet. At Nora Springs, nine miles above Rockford, the same rock is seen to have a thickness of about seven feet; while two and one-half miles south, at the "Old Rowley Quarry," in the east bank of the Shell Rock, it attains a thickness of upward of eighteen feet. At these localities were collected *S. disjuncta*, *S. chemungensis*, *O. iowensis*, *A. hystrix*, *A. reticularis*, *S. demissa*, *Strobilocystites calvini*, etc.

\* As will be seen by referring to the map, this is one of the few localities where fossil remains, in any considerable numbers, are found in the rocks underlying the shales.

† These rocks differ from those described in the last section only in being more or less crystalline.

are of very various lithological characters, varying from yellowish-white and often very heavy-bedded limestone, to dark, grayish-brown crystalline dolomite, with but very few and poorly preserved fossils.

In the north-eastern portion of Worth County, on Deer Creek, near Carpenter, the limestone exposed is rather unevenly bedded and slightly friable, varying in color from yellowish-white to dark grayish-brown, and, so far as observed, devoid of fossil remains.

In lithological character, the rocks outcropping along Rock Creek, in the south-western portion of Mitchell County, are very much like those observed at the locality one mile above Charles City, in Floyd County. The beds, however, are much thicker, and contain an abundance of fossils, represented by the genera *Stromatopora*, *Cyathophyllum*, *Favosites*, and a few of the more common *Brachiopoda*.\*

On the Shell Rock, at Nora Springs, in Floyd County, there is an exposure of over forty feet of limestone, the beds of which vary somewhat in lithological character, but are, for the most part, fine-grained, compact, and more or less brittle limestone (some portions slightly magnesian), crowded with fossils, among which the genera *Favosites*, *Gyroceras*, *Paracyclas*, *Pachyphyllum*, *Stromatopora*, *Alveolites*, *Fenestella*, *Diphyphyllum*, *Atrypa*, and crinoid remains (representing two or three genera) were observed.†

At Rock Falls, in the north-eastern part of Cerro Gordo County, four miles above Nora Springs, the beds below the shales are well exposed. They consist of thin-bedded, hard, and rather crystalline magnesian limestone, varying in color from light gray to nearly black. The most careful search failed to reveal the presence of fossils. The lithological character of the rocks at this place is peculiar, and nothing exactly like it has been observed in any other part of the State. They are all highly magnesian, but not pure dolomites, as they contain rather more lime than belongs to the composition of the double carbonate of lime and magnesia.‡

The following section will give an idea of the general lithological character of the rocks underlying the shales in the region of Mason City, in Cerro Gordo County. It was measured on Lime Creek, three-fourths of a mile above Mason City:

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\* By referring to the map, this will be seen to be the second locality where organic remains are common in the rocks below the shales.

† Most of the species found here are restricted, in their vertical range, to the lower portion of the exposure; while about fifty per cent of the forms do not, so far as is now known, occur in the shales above.

‡ Hall's Geological Survey of Iowa, Vol. I., Part I., page 310.

1. Rather hard, unevenly-bedded limestone, containing  
*Stromatopora* and *Favosites*..... 4 feet.
  2. Grayish or dove-colored fine-grained and somewhat  
brittle limestone.....16 "
  3. Granular limestone, somewhat magnesian..... 3 "
  4. Uniformly bedded magnesian limestone..... 8 "
- Total.....31 feet.

In no other portion of Iowa is the superficial covering of the rocks thinner than over a large portion of the area occupied by the four counties mapped. Not only are the rocks well exposed on most of the streams which traverse the region, but limited exposures are numerous adjacent to them, especially in Floyd County. For this reason, the underlying rocky strata can be studied with facility.

It may not be out of place here to give a short description of the only rock which overlies the shales at any place, so far as observed.

On Section 6, in Township 94 N., 18 W., Floyd County, there is an exposure of coarse-grained sandstone, forming, for a short distance, the north margin of a rather deep trough-shaped depression in the Devonian strata. This outlier is a very coarse-grained, friable, silicious sandstone, interstratified with fine, angular gravel (the angles being more or less rounded), while some of the beds exhibit beautiful examples of ripple-marks.\* This rock varies in color from grayish-white to very dark yellowish-brown, and in some places is capped by vesicular conglomerate. The bed, so far as could be made out, attains a thickness of from thirty to seventy feet, the upper portion of which is thin-bedded and very much disturbed and broken up, being tilted at almost every conceivable angle, and overlaid at one place by a grayish-white limestone. The lower portion of the stratum is heavy-bedded, and dips at an angle of about twenty-two degrees, in a direction a little west of north.

The section shown by Figure 2, across this depression or valley from north to south, will show the position which the sandstone occupies in relation to the depression and the Devonian strata, the thin-bedded horizontal rock representing the Rockford shales, and the heavier strata beneath representing the subjacent limestones. The trough-like depression, which is in part bordered by this outlier, has an easterly trend, and finally unites with the valley of the Shell Rock. Its average width is about three-fourths of a mile, and its depth from forty to

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\* This rock is rather peculiar, and nothing exactly like it has been observed in other portions of the State. I have referred it to the Cretaceous, with some doubt as to its true age, since it is quite unfossiliferous.

seventy feet. It is believed that this depression was at one time entirely filled by this sandstone, and subsequently eroded by the action of the ice and the waters derived from the melting of it, during the glacial period.

That a better understanding of the richness of the Rockford shale fauna and its relation to that of the subjacent strata may be gained, I append a partial catalogue of the forms known to occur in them.\* A large percentage of the species enumerated have not been catalogued by previous writers; but my own collection, made personally, embraces all but one or two of the species listed, and these I have examined in the cabinets of others who have personally collected them.

The species followed by † occur in the rocks which underlie the shales, but do not extend upward into the shales. Some of those followed by ? are undescribed forms, while others occur in the form of casts, making their specific identification uncertain.

<i>Stromatopora incrustans</i> , H. & W.	<i>Spirorbis omphalodes</i> , Goldfuss.
<i>Stromatopora expansa</i> , H. & W.	<i>Pleurotomaria</i> ———?
<i>Stromatopora solidula</i> , H. & W.	<i>Acervularia inequalis</i> , H. & W.
<i>Ambonychia</i> ———†?	<i>Smithia johanna</i> , H. & W.
<i>Caunopora planulata</i> , H. & W.	<i>Smithia multiradiata</i> , H. & W.
<i>Rhynchonella venustula</i> , † Hall.	<i>Callonema lichas</i> ? H.
<i>Tellinomya</i> ———?	<i>Stromatopora alternata</i> , H. & W.
<i>Fistulipora occidens</i> , H. & W.	<i>Crania famelica</i> , H. & W.
<i>Alveolites rockfordensis</i> , H. & W.	<i>Pachyphyllum woodmani</i> , White. §
<i>Aulopora iowensis</i> , H. & W.	<i>Strophodonta arcuata</i> , Hall.
<i>Cladopora robusta</i> , ‡ Rom.	<i>Gyroceras</i> ———†?
<i>Aulopora saxivada</i> , H. & W.	<i>Orthoceras vastator</i> , Hall.
<i>Zaphrentis solida</i> , H. & W.	<i>Orthoceras procerus</i> , Hall.
<i>Campophyllum nanum</i> , H. & W.	<i>Strophodonta canace</i> , H. & W.
<i>Aulopora</i> ———?	<i>Strophodonta variabilis</i> , Calvin.
<i>Cypricardina sublamellosa</i> ? H.	<i>Cryptonella eudora</i> , Hall.
<i>Stromatopora</i> ———?	<i>Dictyonema</i> ———?
<i>Chonophyllum ellipticum</i> , H. & W.	<i>Strobilocystites calvini</i> , † White. ¶
<i>Cystiphyllum mundulum</i> , H. & W.	<i>Spirifera ziczac</i> , † Hall.
<i>Chonophyllum</i> ———?	<i>Strophonella reversa</i> , Hall.
<i>Spirorbis arkonensis</i> , Nich.	<i>Fenestella</i> ———?

\* Aside from the species herein listed, we have in our cabinet over *eighty* additional forms from the shales, most of which are undescribed.

‡ The individuals of this species are exceedingly rare in the shales, and constitute the only representatives of the genus *Cladopora* yet obtained here.

§ This species is not very abundant in the shales, and is somewhat limited in its geographical range. It sometimes occurs in the limestone immediately underlying the shales.

¶ This species was collected by me from the sandstone which underlies the shales, at Nora Springs. It differs from the forms of this species collected at Iowa City, Iowa, mainly in being somewhat larger. It is of much interest to note the wide distribution of this rare species in the Devonian rocks of this State.

Streptorhynchus chemungensis, Con.	Leiorhynchus ———?
Orthis impressa, Hall.	Leiorhynchus iris, Hall.
Productella truncata, Hall.	Ambocælia umbonata, Con.‡
Spirifera whitneyi, Hall.	Gypidula occidentalis, Hall.
Spirifera hungerfordi, Hall.	Paracyclas ——— †?
Spirifera orestes, H. & W.	Euomphalus ———?
Platystoma ———?	Loxonema pexatum, Hall.
Tentaculites ———?	Orthoceras ———?
Spirifera cyrtiniformis, H. & W.	Athyris vittata, Hall.§
Spirifera fimbriata, Con.	Terebratula navicella, Hall.
Leperditia ———?	Cryptonella calvini, H. & W.
Atrypa reticularis, Lin.	Aviculopecten ———?
Spirifera disjuncta, † Sow.*	Naticopsis gigantea, H. & W.
Orthis ———?	Crania ———?
Atrypa hystrix, Hall.	Favosites ———?
Stenochisma contractum, var. saxa-	Paracyclas sabini, White.
tile, Hall.	Spirifera macbridei, Calvin.
Loxonema ———?	Platystoma lineata, Con.

Plates of Placoderm fishes allied to *Dinichthys*, and the teeth of other species of fishes. There are also the remains of at least ten species of crinoids, many of which are common both to the shales and the underlying limestones.

The view that some of the fossil forms found in the shales were "drifted in," is advanced by some geologists. I can see no good evidence for this hypothesis, however. I do not, at the present moment, recollect of a single species (with the exception of *Atrypa reticularis*, which occurs in the Niagara) occurring in the shales which is represented in any other rocks, either above or below the Devonian. Neither have I observed more than twenty or thirty species (none of the "drifted" ones are included) to occur in the rocks which immediately underlie the shales, that do not also occur in the shales themselves.

The bedding of all the Devonian rocks, in this part of Iowa, including the shales, is nearly or quite horizontal, showing no evidence of disturbance at or subsequent to their formation. Any agency sufficient to transport these forms from a distance, would also seem capable of leaving a record of its action upon the shaly beds which contained them. But if they were "drifted in" by the ordinary action of the sea, it is evident that they would have been too poorly preserved to be identified even as fossils.

\* This species occurs throughout the sandstone at Rockford and Nora Springs, but is not found in any of the rocks which underlie or overlie it.

‡ The discovery of this species in the Rockford shales is of much interest, as I believe its extreme western limit has been heretofore believed to be in the vicinity of Widder, Ontario.

§ This species was not before supposed to occur so far north in the Devonian rocks of Iowa.

It is true that a few of the more common *Brachiopoda* and corals found in these beds were worn and smoothed by attrition before being imbedded; but if those forms (mostly *Lamellibranchiata*) which are supposed to have been transported had been subjected to the same action, all traces of organization would have been obliterated.

Again, there is no evidence that any of these forms were brought in living, as their remains do not occur outside the shales.

It seems, then, that only one inference can be drawn, and that is, that all of the forms found in the shales were indigenous; that all of the individuals lived, died, and became imbedded where they are found to-day.

From the general lithological characters of the shales, it would seem that they originated as a shallow shore deposit formed at about the close of the Devonian age in Iowa. The organic life of the old Devonian sea, in this portion of its area, culminated in these beds, the underlying rocks, for the most part, being singularly devoid of fossil remains.

## MOUND EXPLORATIONS IN NORTHWESTERN IOWA.

BY FREDERICK STARR, PH.D.

*(Read before the Academy, June 24th, 1887.)*

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IN November last, I had an opportunity of examining some remains in Lyon County, in the extreme north-west corner of Iowa. These have no great antiquity, but present some points of interest. The locality is on the Burlington, Cedar Rapids & Northern Railroad, a mile beyond "LaValley" station, or "Brown's." The spot lies near the Little Sioux River and from it we may look across into Dakota, where ridges with similar mounds may be seen. The remains occur on a ridge, and consist of a great number of mounds and peculiar stone circles.

The following description sums up my own explorations and those of Messrs. Nash and Cotton, surveyors in the employ of the railroad company.

The mounds are mostly round, from thirty to fifty feet diameter, and from three to eight feet high. Some few are oval and larger than the above figures. There are very many of these mounds with no regular arrangement. Upon the summit of the ridge there are great numbers of "stone circles." These are made of boulders laid with some care and sunk some distance into the ground. *Some* mounds are scattered around among these circles, but most of them surround the circle-dotted area in a rude oval. The whole ground around the mounds and circles is strewn with flint flakes, arrowheads, scrapers, potsherds, etc. Stone mauls of good workmanship are found in the neighborhood.

To particularize, we opened two mounds—Nos. 1 and 2—and have most of the specimens found in two others—3 and 4. In Mound No. 1 the material was a hard gravel, difficult to dig. Patches of ashes were found. At a depth of two feet was found a skeleton with head to the north and body stretched to the south. All the bones were found in fair preservation. No "relics" were discovered.

The following structure was found in No. 2: 1, gravel; 2, black soil; 3, ashes and black soil; 4, gravel. Some fragments of bones and some potsherds were found in the second and third layers.

Mounds 3 and 4 were alone, on a lofty ridge, south of the railroad. No. 3 yielded skeletons of two adults and one child; also the bones of a horse. A pipe was found here also. Deeper digging procured another skeleton (adult), and a dog's skeleton wrapped in buckskin. The relics were six iron bracelets, fifteen feet of wampum, a grinding stone and a red pipestone pipe. The skeleton had ear-rings of copper attached to the head. Where the copper had oxidized, the skin and hair were preserved. This very peculiar specimen is now at Burlington. This mound was enclosed within a stone circle.

Mound No. 4 yielded a "stone wheel," an arrowhead, a pretty little maul of reddish granite, part of a jar, and some very *hard* bone fragments. A line of stones was laid across each end of this mound, the lines being six or seven feet apart. The stone wheel deserves description. It is perfectly true and elegantly polished. It is of a dark, fine grain, solid stone. Its sides—*i. e.*, top and bottom surfaces—are concave; its rim, a perfect circle in outline, is convex in surface. The specimen is six inches diameter and is perforated by a half-inch hole at the centre. At the outer edge the *thickness* is about one and one-half inches; at the inner edge one-half inch or less. This stone was evidently used in some pitching game, and is as fine as any of the southern specimens of the same kind.

Regarding the stone circles, I copy from my note-book: One, near Mound No. 1, was elliptical. It consists of one hundred and ten boulders, averaging a foot in diameter. They are set almost close together, and are of all kinds—quartzite, granite, gneiss, schist, etc. In another, the stones are nearly all of the same kind. In a third, two feet intervene between boulders. One circle was sixty-three by thirty-seven feet, and contained one hundred and ninety-seven stones. Nearly all the circles have an "opening," one to four and a half feet wide, at the south-east. Some few are "double"—one circle concentric with another. Some have "guard stones" at the openings. Some circles are confluent, and have some boulders in common. One group of confluent circles contains seven, of which two are "*double*." These circles are generally supposed to be lines of stones to hold tent edges down. I am not entirely satisfied that this is so. The fact that nearly all the "openings" are to the south-east, while the prevailing wind is north-west, seems to favor this theory. But if it is true, how shall we account for the circle around Mound 3, the lines of stones upon Mound 4, or the very peculiar little circle on a steep side-hill, where a great granite boulder is surrounded by a ring of smaller boulders, not accu-

rately round, but somewhat heart-shaped? It is evident that *all* are not "tent anchors."

A missionary of the American Sunday-school Union tells me that stone mauls are yet common among the Dakotas, who use them in preparing food. Choke-cherries are gathered, pounded to a pulp with these mauls, kneaded into cakes, and dried. Also, a peculiar tuber, with a structure somewhat like an onion, is gathered. The outer skin is husked off, and the rest pounded into a meal, which is mixed with water, moulded into cakes, and cooked. These are not the only functions of such "mauls." Indian implements are remarkable for their manifold uses.

The state of the bones, the condition of the wampum, the preservation of the buckskin, the occurrence of iron, the presence of the skeleton of a horse, all go to show that there is no great antiquity for these remains. The story told is of a Dakota village, populous and active; tents of skins, anchored by boulder-stones; arts of pottery making, stone polishing, and flint chipping, fairly developed; trade carried on with the whites to the east; the dead buried in mounds on the outskirts of the town; date, fifty to one hundred years ago.

## PRELIMINARY ANNOTATED CATALOGUE OF THE BIRDS OF IOWA.

BY CHARLES R. KEYES AND H. S. WILLIAMS, M.D.

*Read before the Academy, December 30, 1887.*

IN presenting the following catalogue of the Birds of Iowa it is proposed to offer a preliminary statement of a more extended account of the birds of the State, now in course of preparation. It is hoped that Iowa students and collectors who are interested in ornithology, and into whose hands this paper may fall, will give all possible aid both by furnishing notes and local lists, and by the loan of such specimens as may be desired for examination. It should be borne in mind that only such species are inserted as have come under the personal observations of the writers; and, for the most part, skins or mounted specimens of the species herein enumerated, are to be found in their collections. While there have been species observed which it has been hitherto impossible to secure, it has been thought advisable not to list them until there is material in the collections which would corroborate any statements made in regard to them. For this reason a number of forms which, in all probability, occur within the limits of the State have not been mentioned.

The observations, of which the present paper is a résumé, were made chiefly in the vicinities of Charles City, Des Moines, and Iowa City; and these have been supplemented by notes made by the writers at various times in different parts of the State. The dates of arrivals and departures are based entirely upon studies conducted in the vicinage of Des Moines. Although possessed of extended notes from other parts of the State upon the appearance in the spring and departure in the fall of the various species of birds, the notes from Des Moines have been exclusively used because of its central location in Iowa, and, therefore, representing nearly a mean for the arrivals and departures over the whole State.

The nomenclature and classification is that adopted by the American Ornithologists' Union, in its check list of North American Birds. Reference, by number, is also made to Baird's Catalogue of North American Birds, 1858, (B); Ridgway's Catalogue of 1881, (R); Coues'

Check List of 1882, (C); and the check list of the American Ornithologists' Union of 1886, (U).

ORDER **PYGOPODES.** DIVING BIRDS.

SUBORDER **PODICIPEDES.** GREBES.

FAMILY **PODICIPIDÆ.** GREBES.

GENUS **COLYMBUS** LINNÆUS.

SUBGENUS **DYTES** KAUP.

[B 706, R 732, C 848, U 3.]

*Colymbus auritus* Linn. Horned Grebe. A rather common migrant; not as yet observed breeding within the limits of the State.

[B 707, R 733 a, C 850, U 4.]

*Colymbus nigricollis californicus* (Heerm.). American Eared Grebe. Occurs in some portions of the State, but is not very common.

GENUS **PODILYMBUS** LESSON.

[B 709, R 735, C 852, U 6.]

*Podilymbus podiceps* (Linn.). Pied-billed Grebe. Common summer resident; breeds in "sloughs." On June 2, 1885, a fine set of eggs was taken in a grassy marsh near Des Moines. The nest was composed of decaying vegetable matter, and was placed in the water among the stems of Indian rice (*Zizania aquatica*). It was about fifteen inches in diameter, and raised about three inches above the surface of the water. In the center of this mat, or nest, was a slight depression in which the eggs were placed.

SUBORDER **CEPPHI.** LOONS AND AUKS.

FAMILY **URINATORIDÆ.** LOONS.

GENUS **URINATOR** CUVIER.

[B 698, R 736, C 840, U 7.]

*Urinator imber* (Gunn.). Loon. Migratory; rather common. Said to breed in the northern part of the State, in the vicinity of the larger "lakes."

ORDER **LONGIPENNES.** LONG-WINGED SWIMMERS.

FAMILY **LARIDÆ.** GULLS AND TERNS.

SUBFAMILY **LARINÆ.** GULLS.

GENUS **LARUS** LINNÆUS.

[B 661, R 666 a, C 773, U 51 a.]

*Larus argentatus smithsonianus* Coues. American Herring Gull.

Common spring and fall migrant arriving about the last of March and passing southward again about the third week in October. It often appears in flocks of a score or more but is more commonly noticed singly, or in companies of three or four, flying about over the rivers in search of food.

[B 664, R 669, C 778, U 54.]

*Larus delawarensis* Ord. Ring-billed Gull. Common about the lakes of Northern Iowa where it is said to breed.

[B 668, 669, R 674, C 787, U 59.]

*Larus franklinii*, Sw. & Rich. Franklin's Gull. Migratory; rather common. Doubtless breeds within the limits of the State. Mr. J. W. Preston found this species breeding at Heron Lake, Minnesota, a few miles from the northern boundary of Iowa.

#### SUBFAMILY STERNINÆ. TERNS.

GENUS *STERNA* LINNÆUS.

SUBGENUS *STERNA*.

[B 691, 686, R 685, C 798, U 69.]

*Sterna forsteri* Nutt. Forster's Tern. Migratory; common. In Central Iowa this species arrives about the first of May and is to be seen gliding gracefully over the rivers and small lakes in search of food.

GENUS *HYDROCHELIDON* BOIE.

[B 695, R 693, C 806, U 77.]

*Hydrochelidon nigra surinamensis* (Gmel.). Black Tern. Spring and fall migrant; abundant. Breeds, especially in the northern part of the State about the grassy marshes and lakes.

#### ORDER *STEGANOPODES*. TOTIPALMATE SWIMMERS.

FAMILY *PHALACROCORACIDÆ*. CORMORANTS.

GENUS *PHALACROCORAX* BRISSON.

SUBGENUS *PHALACROCORAX*.

[B 623, R 643, C 751, U 120.]

*Phalacrocorax dilophus* (Sw. & Rich.) Double-crested Cormorant. Spring and fall migrant; common. Breeds in the northern portion of the State.

FAMILY *PELECANIDÆ*. PELICANS.

GENUS *PELECANUS* LINNÆUS.

SUBGENUS *CYRTOPELICANUS* REICHENBACH.

[B 615, R 640, C 748, U 125.]

*Pelecanus erythrorhynchos* Gmel. American White Pelican. Spring

and fall migrant; abundant. Often appears in large flocks, settling sometimes in such numbers upon the lake shores as to resemble drifts of snow, when seen from a distance.

ORDER **ANSERES**. LAMELLIROSTRAL SWIMMERS.

FAMILY **ANATIDÆ**. DUCKS, GEESE, AND SWANS.

SUBFAMILY **MERGINÆ**. MERGANSERS.

GENUS **MERGANSER** BRISSON.

[B 611, R 636, C 743, U 129.]

*Merganser americanus* (Cass.). American Merganser. Rather common migrant, frequenting the larger water-courses.

[B 612, R 637, C 744, U 130.]

*Merganser serrator* (Linn.). Red-breasted Merganser. Rather rare in all portions of the State, but occasionally taken.

GENUS **LOPHODYTES** REICHENBACH.

[B 613, R 638, C 745, U 131.]

*Lophodytes cucullatus* (Linn.). Hooded Merganser. Spring and fall migrant; rather common. Doubtless breeds within the limits of the State.

SUBFAMILY **ANATINÆ**. RIVER DUCKS.

GENUS **ANAS** LINNÆUS.

[B 576, R 601, C 707, U 132.]

*Anas boschas* Linn. Mallard. Spring and fall migrant; very abundant. Arrives from the south about the middle of March, returning again the first of October and remaining until the first of December. Breeds in the northern part of the State.

[B 577, R 602, C 708, U 133.]

*Anas obscura* Gmel. Black Duck. Migratory; not common. Frequents the larger lakes and rivers, but seldom seen on the smaller streams. Mr. J. A. Allen, however, states that this species is "not uncommon along the rivers and in grassy ponds."

SUBGENUS **CHAULELASMUS** BONAPARTE.

[B 584, R 604, C 711, U 135.]

*Anas strepera* Linn. Gadwall. Spring and fall migrant; rather common. Doubtless breeds in northern Iowa, inasmuch as the young have been taken at "the lakes" in August.

## SUBGENUS MERECA STEPHENS.

[B 585, R 607, C 713, U 137.]

*Anas americana* Gmel. Baldpate. Migratory; common. Has not been observed during the summer.

## SUBGENUS NETTION KAUP.

[B 579, R 612, C 715, U 139.]

*Anas carolinensis* Gmelin. Green-winged Teal. Abundant migrant. Breeds about the grassy marshes.

## SUBGENUS QUERQUEDULA STEPHENS.

[B 581, R 609, C 716, U 140.]

*Anas discors* Linn. Blue-winged Teal. Abundant spring and fall migrant; and common summer resident, breeding in the "sloughs."

## GENUS SPATULA BOIE.

[B 583, R 608, C 718, U 142.]

*Spatula clypeata* (Linn.). Shoveller. Migratory; rather common. Has not yet been observed breeding within the limits of the State.

## GENUS DAFILA STEPHENS.

[B 578, R 605, C 710, U 143.]

*Dafila acuta* (Linn.). Pintail. Spring and fall migrant; abundant. Appears the second week in March, and remains until the middle of April, returning again in October. Very large flocks are not unfrequently seen about the open ponds on the prairies.

## GENUS AIX BOIE.

[B 587, R 613, C 719, U 144.]

*Aix sponsa* (Linn.). Wood Duck. Abundant migrant and rather common summer resident, especially in the northern part of the State where it frequents the wooded watercourses.

## GENUS AYTHYA BOIE.

[B 591, R 618, C 723, U 146.]

*Aythya americana* (Eyt.). Red-head. Spring and fall migrant; abundant, though in some localities it does not appear to be common.

[B 592, R 617, C 724, U 147.]

*Aythya vallisneria* (Wils.). Canvas-back. Not as abundant as the last species, but rather common.

## SUBGENUS FULIGULA STEPHENS.

[B 588, R 614, C 720, U 148.]

*Aythya marila nearctica* Stejn. American Scaup Duck. Migratory; not common.

[B 589, R 615, C 721, U 149.]

*Aythya affinis* (Eyt.). Lesser Scaup Duck. Migratory; rather common.

[B 590, R 616, C 722, U 150.]

*Aythya collaris* (Donov.). Ring-necked Duck. Spring and fall migrant; abundant from the middle of March to the middle of April, and from the middle of October to the middle of November. Sometimes winters about the rapids in the streams, even in the northern part of the State.

GENUS **GLAUCIONETTA** STEINER.

[B 593, R 620, C 725, U 151.]

*Glaucionetta clangula americana* (Bonap.). American Golden-eye. Migrant; rare. During several years past only a few have been observed within the limits of the State.

GENUS **CHARITONETTA** STEINER.

[B 595, R 621, C 727, U 153.]

*Charitonetta albeola* (Linn.). Buffle-head. Spring and fall migrant; common.

GENUS **ERISMATURA** BONAPARTE.

[B 609, R 634, C 741, U 167.]

*Erismatura rubida* (Wils.). Ruddy Duck. Migratory, not very common.

SUBFAMILY ANSERINÆ. GEESE.

GENUS **CHEN** BOIE.

[B —, R 591 a, C 696, U 169.]

*Chen hyperborea* (Pall.). Lesser Snow Goose. Not uncommon during periods of migration.

GENUS **ANSER** BRISSON.

[B 565, 566, R 593 a, C 693, U 171 a.]

*Anser albifrons gambeli* (Hartl.). American White-fronted Goose. Abundant during both spring and fall migrations.

GENUS **BRANTA** SCOPOLI.

[B 567, R 594, C 702, U 172.]

*Branta canadensis* (Linn.). Canada Goose. Migratory; common. Breeds in the vicinity of Spirit Lake and other localities in Northern Iowa.

[B 569, R 594 a, C 704, U 172 a.]

*Branta canadensis hutchinsii* (Sw. & Rich.). Hutchins' Goose. Migratory; not uncommon.

## SUBFAMILY CYGNINÆ. SWANS.

GENUS *OLOR* WAGLER.[B 561 *his*, R 588, C 689, U 180.]*Olor columbianus* (Ord.). Whistling Swan. Rare migrant.

[B 562, R 589, C 688, U 181.]

*Olor buccinator* (Rich.). Trumpeter Swan. Migratory; not common. Said to breed in the northwestern part of the State.

## ORDER HERODIONES. HERONS, STORKS, IBISES, ETC.

## SUBORDER HERODII. HERONS, EGRETS, BITTERNS, ETC.

## FAMILY ARDEIDÆ. HERONS, BITTERNS, ETC.

## SUBFAMILY BOTAURINÆ. BITTERNS.

GENUS *BOTAURUS* HERMANN.

## SUBGENUS BOTAURUS.

[B 492, R 497, C 666, U 190.]

*Botaurus lentiginosus* (Montag.). American Bittern. Migratory; common in Southern and Central Iowa. Summer resident in the northern part of the State, where it breeds abundantly about the "lakes" and grassy marshes.

## SUBGENUS ARDETTA GRAY.

[B 491, R 498, C 667, U 191.]

*Botaurus exilis* (Gmel.). Least Bittern. Common summer resident. Breeds in the "sloughs." The nest is a small platform of stems of plants woven among the growing stems of the Indian rice (*Zizania aquatica*), and placed about a foot above the water. Eggs four or five, laid about the last of May.

## SUBFAMILY ARDEINÆ. HERONS AND EGRETS.

GENUS *ARDEA* LINNÆUS.

## SUBGENUS ARDEA.

[B 487, R 487, C 655, U 194.]

*Ardea herodias* Linn. Great Blue Heron. Migratory; common. Breeds in the vicinity of Spirit Lake and other parts of Northern Iowa.

## SUBGENUS HERODIAS BOIE.

[B 486, 486\*, R 489, C 658, U 196.]

*Ardea egretta* Gmel. American Egret. Summer resident; rare. Observed along the borders of wooded streams.

## SUBGENUS GARZETTA KAUP.

[B 485, R 490, C 659, U 197.]

*Ardea candidissima* Gmel. Snowy Heron. Very rare. Has been taken at Des Moines, and in Floyd County in August.

## SUBGENUS FLORIDA BAIRD.

[B 490, R 493, C 662, U 200.]

*Ardea cærulea* Linn. Little Blue Heron. Rare. Observed only during the summer, in the eastern part of the State.

## SUBGENUS BUTORIDES BLYTH.

[B 493, R 494, C 663, U 201.]

*Ardea virescens* Linn. Green Heron. Common summer resident, arriving the last of April. Nests usually in small colonies among the willows in swampy localities. Often a single pair is found nesting a mile or two from water, and occasionally, also, in evergreens.

## GENUS NYCTICORAX STEPHENS.

## SUBGENUS NYCTICORAX.

[B 495, R 495, C 664, U 202.]

*Nycticorax nycticorax naevius* (Bodd.). Black-crowned Night Heron. Summer resident; rather common in some localities.

## ORDER PALUDICOLÆ. CRANES, RAILS, ETC.

## SUBORDER GRUES. CRANES.

## FAMILY GRUIDÆ. CRANES.

## GENUS GRUS PALLAS.

[B 478, R 582, C 668, U 204.]

*Grus americana* (Linn.). Whooping Crane. Not uncommon during migrations. Occasionally breeds in the northern part of the State.

[B 479, R 583, C 670, U 206.]

*Grus mexicana* (Müll.). Sandhill Crane. Abundant migrant, arriving about the middle of March, and, on the return, again in October. Breeds on the prairies of northwestern Iowa.

## SUBORDER RALLI. RAILS, GALLINULES, COOTS, ETC.

## FAMILY RALLIDÆ. RAILS, GALLINULES, AND COOTS.

## SUBFAMILY RALLINÆ. RAILS.

## GENUS RALLUS LINNÆUS.

[B 552, R 569, C 676, U 208.]

*Rallus elegans* Aud. King Rail. Not uncommon during migra-

tions. Breeds in the marshes near the larger lakes and in "sloughs." Unfledged young were found at Clear Lake late in August.

[B 554, R 572, C 677, U 212.]

*Rallus virginianus* Linn. Virginia Rail. Rather common during migrations. Breeds in grassy marshes.

GENUS **PORZANA** VIEILLLOT.

SUBGENUS **PORZANA**.

[B 555, R 574, C 679, U 214.]

*Porzana carolina* (Linn.). Sora. Migratory; common. Arrives the last of April. Breeds in the sloughs of northern Iowa.

SUBGENUS **COTURNICOPS** BONAPARTE.

[B 557, R 575, C 680, U 215.]

*Porzana noveboracensis* (Gmel.). Yellow Rail. Occasionally observed during migrations. Frequents the prairie sloughs, where it perhaps breeds.

SUBFAMILY **GALLINULINÆ**. GALLINULES.

GENUS **GALLINULA** BRISSON.

[B 560, R 579, C 685, U 219.]

*Gallinula galeata* (Licht.). Florida Gallinule. Common summer resident, breeding the last of May in the marshes of Indian rice (*Zizania aquatica*), and rushes (*Scirpus validus*). The nest is usually placed upon broken-down stems just above the water or often resting in the water, and is composed chiefly of rush stems. Eggs eight to fourteen.

SUBFAMILY **FULICINÆ**. COOTS.

GENUS **FULICA** LINNÆUS.

[B 559, R 580, C 686, U 221.]

*Fulica americana* Gmel. American Coot. Abundant during migrations. Breeds.

ORDER **LIMICOLÆ**. SHORE BIRDS.

FAMILY **PHALAROPODIDÆ**. PHALAROPES.

GENUS **PHALAROPUS** BRISSON.

SUBGENUS **STEGANOPUS** VIEILLLOT.

[B 519, R 565, C 602, U 224.]

*Phalaropus tricolor* (Vieillot.). Wilson's Phalarope. Common during migrations in some localities; rarely seen in others. Breeds in the grassy prairie marshes.

FAMILY **SCOLOPACIDÆ**. SNIPES, SANDPIPERS, ETC.GENUS **PHILOHELA** GRAY.

[B 522, R 525, C 606, U 228.]

*Philohela minor* (Gmel.). American Woodcock. Summer resident; not uncommon in the woodlands bordering the water-courses.

GENUS **GALLINAGO** LEACH.

[B 523, R 526 a, C 608, U 230.]

*Gallinago delicata* (Ord.). Wilson's Snipe. Spring and fall migrant; abundant.

GENUS **MACRORHAMPHUS** LEACH.

[B 524, R 527, C 609, U 231.]

*Macrorhamphus griseus* (Gmel.). Dowitcher. Not uncommon during the migratory periods.

GENUS **MICROPALAMA** BAIRD.

[B 536, R 528, C 611, U 233.]

*Micropalama himantopus* (Bonap.). Stilt Sandpiper. Migratory; very rare. Observed but once, and that in early autumn on the open prairie in Floyd County. There were four individuals wading about in a small pond; a single specimen only was secured.

GENUS **TRINGA** LINNÆUS.SUBGENUS **ACTODROMAS** KAUP.

[B 531, R 534, C 616, U 239.]

*Tringa maculata* Vieill. Pectoral Sandpiper. Migratory; abundant. Frequents the prairie ponds.

[B 533, R 536, C 617, U 240.]

*Tringa fuscicollis* Vieill. White-rumped Sandpiper. Rather common migrant, appearing the last of March about the quiet pools near the water-courses.

[B 532, R 538, C 614, U 242.]

*Tringa minutilla* Vieill. Least Sandpiper. Migratory; abundant. Observed at Fairfield, July 13, 1886; there were several of this species feeding on the borders of the reservoir of the water-works, just north of the town.

GENUS **EREUNETES** ILLIGER.

[B 535, R 541, C 612, U 246.]

*Ereunetes pusillus* (Linn.). Semipalmated Sandpiper. Spring and fall migrant; rather common.

GENUS **CALIDRIS** CUVIER.

[B 534, R 542, C 627, U 248.]

*Calidris arenaria* (Linn.). Sanderling. Not common. Occurs during migrations about the lakes of Northern Iowa.

GENUS *LIMOSA* BRISSON.

[B 547, R 543, C 628, U 249.]

*Limosa fedoa* (Linn.). Marbled Godwit. Not very common. Frequenters prairie ponds during migratory periods.

GENUS *TOTANUS* BECHSTEIN.SUBGENUS *GLOTTIS* KOCH.

[B 539, R 548, C 633, U 254.]

*Totanus melanoleucus* (Gmel.). Greater Yellow-legs. Migratory; common during April and September, feeding in small companies on low, wet flats adjacent to water-courses.

[B 540, R 549, C 634, U 255.]

*Totanus flavipes* (Gmel.). Yellow-legs. Migratory; common. Frequenters the bayous along the rivers, and the muddy borders of prairie ponds.

SUBGENUS *RHYACOPHILUS* KAUP.

[B 541, R 550, C 637, U 256.]

*Totanus solitarius* (Wils.). Solitary Sandpiper. Migratory; common. Arrives the middle of April, frequenting the secluded pools in marshy woodlands. Doubtless breeds in the State, but thus far its eggs have not been discovered within its limits.

GENUS *SYMPHEMIA* RAFINESQUE.

[B 537, R 552, C 632, U 258.]

*Symphemia semipalmata* (Gmel.). Willet. Migratory; not uncommon about the sloughs.

GENUS *BARTRAMIA* LESSON.

[B 545, R 555, C 640, U 261.]

*Bartramia longicauda* (Bechst.). Bartramian Sandpiper. Summer resident; abundant; frequenting the prairies. Arrives the middle of April. Nidification commences about the middle of May. During the nesting season it is the most solicitous of birds. So fearless is it, at times, that it may be killed with a walking-stick or struck with a whip as it rests upon posts along the roadside.

GENUS *ACTITIS* ILLIGER.

[B 543, R 557, C 638, U 263.]

*Actitis macularia* (Linn.). Spotted Sandpiper. Common summer resident, arriving the middle of April. Nests on the sand-bars along the streams.

GENUS *NUMENIUS* BRISSON.

[B 549, R 558, C 643, U 264.]

*Numenius longirostris* Wils. Long-billed Curlew. Migratory; rather common. A few remain during the summer and nest on the open prairies.

FAMILY **CHARADRIIDÆ**. PLOVERS.GENUS **CHARADRIUS** LINNÆUS.SUBGENUS **SQUATAROLA** CUVIER.

[B 510, R 513, C 580, U 270.]

*Charadrius squatarola* (Linn.). Black-bellied Plover. Spring and fall migrant; rare.

SUBGENUS **CHARADRIUS** LINNÆUS.

[B 503, R 515, C 581, U 272.]

*Charadrius dominicus* Müll. American Golden Plover. Spring and fall migrant; abundant. Arrives the first week in April. Has been taken at Des Moines as late as June 6.

GENUS **ÆGIALITIS** BOIE.SUBGENUS **OXYECHUS** REICHENBACH.

[B 504, R 516, C 584, U 273.]

*Ægialitis vocifera* (Linn.). Killdeer. Abundant migrant and common summer resident. Arrives the middle of March.

ORDER **GALLINÆ**. GALLINACEOUS BIRDS.

SUBORDER PHASIANI. PHEASANTS, GROUSE, PARTRIDGES,  
QUAILS, ETC.

FAMILY **TETRAONIDÆ**. GROUSE, PARTRIDGES, ETC.SUBFAMILY **PERDICINÆ**. PARTRIDGES.GENUS **COLINUS** LESSON.

[B 471, R 480, C 571, U 289.]

*Colinus virginianus* (Linn.). Bob-white. Common resident; formerly more abundant than now. During the winter many farmers care for them, the quails coming regularly, like chickens, morning and evening to be fed. During the fall flocks of these birds frequently come into the towns, especially where there are many evergreens, and pass the night. The nest is placed often in open woodland or meadows. Eggs number from twelve to twenty in a single nest.

SUBFAMILY **TETRAONINÆ**. GROUSE.GENUS **BONASA** STEPHENS.

[B 465, R 473, C 565, U 300.]

*Bonasa umbellus* (Linn.). Ruffed Grouse. Resident; common in some localities, rare in others. In the vicinity of Iowa City, and the eastern portion of the State generally, it appears to be quite common in the woodlands where it is found breeding. At Des Moines and in some other localities it is seldom seen.

GENUS **TYMPANUCHUS** GLOGER.

[B 464, R 477, C 563, U 305.]

*Tympanucus americanus* (Reich.). Prairie Hen. Resident; abundant, though usually noticed more frequently during the fall and winter than at other seasons of the year. Wanders about in large flocks through the fields in search of food. It is reported that large numbers are killed by flying against the telegraph wires and barbed-wire fences. Instances of the latter, especially, have come under the observer's notice, as well as many similar ones among the smaller birds.

GENUS **PEDIOCÆTES** BAIRD.

[B —, R —, C —, U 308 b.]

*Pediacates phasianellus campestris* Ridgw. Prairie Sharp-tailed Grouse. Common on the prairies of northwestern Iowa.

FAMILY **PHASIANIDÆ**. PHEASANTS, ETC.SUBFAMILY **MELEAGRINÆ**. TURKEYS.GENUS **MELEAGRIS** LINNÆUS.

[B 457, R 470 a, C 554, U 310.]

*Meleagris gallopavo* Linn. Wild Turkey. Resident; formerly very abundant, but becoming less common each year. A few are occasionally taken in the heavily timbered districts along the streams.

ORDER **COLUMBÆ**. PIGEONS.FAMILY **COLUMBIDÆ**. PIGEONS.GENUS **ECTOPISTES** SWAINSON.

[B 448, R 459, C 543, U 315.]

*Ectopistes migratorius* (Linn.). Passenger Pigeon. Large flocks occasionally appear in different parts of the State. A few are usually seen each spring, and a few pairs sometimes breed within the limits of the State. A nest with one egg was taken at Charles City, June 14, 1879.

GENUS **ZENAIDURA** BONAPARTE.

[B 451, R 460, C 544, U 316.]

*Zenaidura macroura* (Linn.). Mourning Dove. Common summer resident from the first week in April until November. Nidification usually commences by the last of April. Although this species generally builds its nest in a tree, several nests have been found on the ground and on low stumps. One instance was presented in which the nest with eggs was found on plowed ground in a corn-field.

ORDER **RAPTORES**. BIRDS OF PREY.SUBORDER **SARCORHAMPHI**. AMERICAN VULTURES.FAMILY **CATHARTIDÆ**. AMERICAN VULTURES.GENUS **CATHARTES** ILLIGER.

[B 1, R 454, C 537, U 325.]

*Cathartes aura* (Linn.). Turkey Vulture. Common summer resident, arriving early in April and remaining until November. At Van Meter, in Dallas County, a dozen or more, in company with crows, were noticed on a sand-bar in the Racoon River, feeding upon dead mussels. The water in the river had been quite high for some time, and had fallen rather suddenly, leaving thousands of mussels stranded on the bar, where they had died and were decaying.

SUBORDER **FALCONES**. VULTURES, FALCONS, HAWKS, BUZZARDS, EAGLES, KITES, HARRIERS, ETC.FAMILY **FALCONIDÆ**. VULTURES, FALCONS, HAWKS, EAGLES, ETC.SUBFAMILY **ACCIPITRINÆ**. KITES, BUZZARDS, HAWKS, GOSHAWKS, EAGLES, ETC.GENUS **ELANOIDES** VIEILLLOT.

[B 34, R 426, C 493, U 327.]

*Elanoides forficatus* (Linn.). Swallow-tailed Kite. Summer resident; common in some localities, rare in others. Arrives in April and departs in September.

GENUS **CIRCUS** LACEPEDE

[B 38, R 430, C 489, U 331.]

*Circus hudsonius* (Linn.). Marsh Hawk. Resident; abundant in some localities, rare in others. In early autumn, large flocks are not unfrequently seen flying over the prairies.

GENUS **ACCIPITER** BRISSON.SUBGENUS **ACCIPITER**.

[B 17, R 432, C 494, U 332.]

*Accipiter velox* (Wils.). Sharp-shinned Hawk. Very common during migratory periods, but not noticed often during the summer.

[B 15, 16, R 431, C 495, U 333.]

*Accipiter cooperi* (Bonap.). Cooper's Hawk. Summer resident; rather common. Arrives about the first of April, and remains until October. All nests examined contained no lining whatever—a few small pieces of bark only being in the center of the depression of the nest. Eggs usually number four or five, laid the last of April.

SUBGENUS *ASTUR* LACÉPÈDE.

[B 14, R 433, C 496, U 334.]

*Accipiter atricapillus* (Wils.). American Goshawk. Rare; observed only during the winter.

GENUS *BUTEO* CUVIER.

[B 23, R 436, C 516, U 337.]

*Buteo borealis* (Gmel.) Red-tailed Hawk. Resident; common. The nest is commonly placed near the top of the highest tree in the forest, and is often visible more than a mile away. The eggs are laid late in March, and are usually two or three—rarely four—in number.

[B 25, R 439, C 520, U 339.]

*Buteo lineatus* (Gmel.). Red-shouldered Hawk. Rather common resident in some localities; rare in others.

[B 18, 19, 22, 28, R 442, C 523, U 342.]

*Buteo swainsoni* Bonap. Swainson's Hawk. Rather common; breeds in central Iowa, and probably in other parts of the State.

[B 27, R 443, C 524, U 343.]

*Buteo latissimus* (Wils.) Broad-winged Hawk. Not uncommon from April to October. In the proceedings of the United States National Museum, Vol. IX., Mr. Ridgway gives a very interesting description of a melanistic specimen of this species taken at Crystal Lake in Hancock County.

GENUS *ARCHIBUTEO* BREHM.

[B 30, 31, R 447, C 525, U 347 a.]

*Archibuteo lagopus sancti-johannis* (Gmel.) American Rough-legged Hawk. Not uncommon; usually noticed from October to March, in the fields and more open woodland.

GENUS *AQUILA* BRISSON.

[B 39, R 449, C 532, U 349.]

*Aquila chrysaetos* (Linn.). Golden Eagle. Rare; a fine specimen of this species was shot near Des Moines several years ago. Several were taken in the eastern part of the State last year (1886).

GENUS *HALIÆTUS* SAVIGNY.

[B 41, 43, R 451, C 534, U 352.]

*Haliæetus leucocephalus* (Linn.). Bald Eagle. Rare. Young have been taken at various times, and kept in confinement for two or three years.

## SUBFAMILY FALCONIDÆ. FALCONS.

GENUS **FALCO** LINNÆUS.SUBGENUS **ESOLON** KAUP.

[B 7, R 417, C 505, U 357.]

*Falco columbarius* Linn. Pigeon Hawk. Usually noticed during the spring and fall migrations. Not common.

SUBGENUS **TINNUNCULUS** VIEILLOT.

[B 13, R 420, 420 a, C 508, 509, U 360.]

*Falco sparverius* Linn. American Sparrow-hawk. Summer resident; common from March until October. Nests in cavities in trees. Commonly met with along country roads, where it perches upon telegraph poles and dead trees. It is not uncommon to see half a dozen or more of these birds at one time, hovering over a field, and ever and anon darting down to seize some unfortunate field-mouse, grasshopper, or reptile.

## SUBFAMILY PANDIONINÆ. OSPREYS.

GENUS **PANDION**. SAVIGNY.

[B 44, R 425, C 530, U 364.]

*Pandion haliaetus carolinensis* (Gmel.) American Osprey. Rare summer resident. This bird is occasionally shot on the Des Moines River a few miles above Des Moines city.

## SUBORDER STRIGES. OWLS.

FAMILY **STRIGIDÆ**. BARN OWLS.GENUS **STRIX** LINNÆUS.

[B 47, R 394, C 461, U 365.]

*Strix pratincola* Bonap. American Barn Owl. Rare. Very seldom seen in central Iowa.

FAMILY **BUBONIDÆ**. HORNED OWLS.GENUS **ASIO** BRISSON.

[B 51, R 395, C 472, U 366.]

*Asio wilsonianus* (Less.). American Long-eared owl. Resident; apparently not as common as some of the other species of Iowa *Bubonidæ*. This may be due, in part, to its nocturnal habits, though it is not unfrequently met with in its favorite haunts—the dark shady woodland covering the bluffs. It commences to breed about the second week in April, and usually appropriates some abandoned nest of a

hawk or crow. A nest found on April 15, 1882, was situated in a small tree in a deep ravine, and was supported only by a few small twigs, at a height of about twenty feet; it contained five slightly incubated eggs. The female was on the nest when discovered, but quietly glided away when the tree was struck with a stick. On the 29th of the same month, two more nests were discovered, and a few days later, another. The first of these three nests was placed about fifteen feet from the ground, in the top of a small oak, and contained three fresh eggs. The second nest contained four newly-hatched young and two eggs nearly incubated; there were, within thirty yards of this nest, a crow's nest with young, and a nest of Cooper's hawk with three eggs. The manœuvres of the parent owls were quite comical. When the ascent to the nest commenced both birds tumbled to the ground feigning injury, and began a series of very plaintive notes, somewhat similar to the whining of young kittens; at the same time their wings were expanded around the body, and a furious snapping of the beaks indulged in—a characteristic exhibited by the young of both this species, the great horned and other owls, even before they leave the nest. The nest found May 3d, contained four young, nearly fledged. A week later, all with the exception of one had left the nest. A number of nests of this species examined recently each contained five eggs, which would seem to be the usual number.

At Charles City, a long-eared owl was picked up on the prairie, several miles from any woods; it was not injured, yet allowed itself to be taken with the hand.

[B 52, R 396, C 473, U 367.]

*Asio accipitrinus* (Pall.). Short-eared Owl. Resident; rather common. Usually noticed flying over fields and marshy meadows in search of food. During the winter they often resort to woodland. Nests in May on open prairie.

GENUS *SYRNIUM* SAVIGNY.

[B 54, R 397, C 476, U 368.]

*Syrnium nebulosum* (Forst.). Barred Owl. Resident; common. Frequents the heavy timber along the streams; nesting commences about the middle of April.

GENUS *NYCTALA* BREHM.

[B 56, 57, R 401, C 483, U 372.]

*Nyctala acadica* (Gmel.). Saw-whet Owl. Not common. Taken occasionally in the autumn.

GENUS **MEGASCOPS** KAUP.[B 49, *part*, R 402, C 465, U 373.]

*Megascops asio* (Linn.). Screech Owl. Resident; common. Perhaps the most familiar of our owls. The eggs are laid in April.

GENUS **BUBO** CUVIER.

[B 48, R 405, C 462, U 375.]

*Bubo virginianus* (Gmel.). Great Horned Owl. Resident; common in the heavy timber bordering the streams. The eggs are laid about the middle of February, and are usually two in number. Of eight nests taken in the immediate vicinity of Des Moines, all contained two eggs each, except one, which contained three. The young are fledged by the first of May. The nest is usually a shallow depression in the bottom of a cavity of some tree; or sometimes an abandoned hawk's nest is selected. An instance of the former nesting-site was presented February 17, 1883, near Des Moines, the place selected being a large sycamore tree. The cavity was about three feet in diameter, and of about the same depth. There were three entrances, a small and narrow one at the top, and two circular ones at the side, the depression containing the eggs being near one of these lateral openings. The bottom of the cavity consisted of decayed wood, which was nearly hidden by snow. Scattered around were a dozen or more tail feathers of the owls; the skull, several bones and bits of fur of a rabbit; the leg of some large raptorial bird, and the remains of several smaller birds besides a recently-captured pigeon.

The great horned owl occupies the same nest year after year, and even if the nest be disturbed and the first set of eggs taken, often deposits a second set in the same nest. A pair of young, just about to leave the nest was taken on May 2, 1882, and kept for three years confined in a barn. About the middle of June the "horns" began to appear, and in three or four weeks were quite conspicuous. These birds were fed on fresh beef and rats—the latter they usually captured.

[B 48, *part*, R 405 *a, part*, C 463, *part*, U 375 *a*.]

*Bubo virginianus subarcticus* (Hoy). Western Horned Owl. Rather rare. Occasionally taken in the northern part of the State.

GENUS **NYCTEA** STEPHENS

[B 61, R 406, C 479, U 376.]

*Nyctea nyctea* (Linn.). Snowy Owl. Rather rare winter visitant in central and southern Iowa; more common in the northern part of the State, where it is found only on the prairies.

ORDER **PSITTACI**. PARROTS, MACAWS, PAROQUETS, ETC.FAMILY **PSITTACIDÆ**.GENUS **CONURUS** Kuhl.

[B 63, R 392, C 460, U 382.]

*Conurus carolinensis* (Linn.). Carolina Paroquet. Formerly occurred in the southern part of the State, but has not been observed recently. Mr. Tripp gives it as having occurred in Decatur County, but it must now be excluded from Iowa's *avi-fauna*.

ORDER **COCCYGES**. CUCKOOS, ETC.

## SUBORDER CUCULI. CUCKOOS.

FAMILY **CUCULIDÆ**. CUCKOOS, ANIS, ETC.

## SUBFAMILY COCCYGINÆ. AMERICAN CUCKOOS.

GENUS **COCCYZUS** Vieillot.

[B 69, R 387, C 429, U 387.]

*Coccyzus americanus* (Linn.). Yellow-billed Cuckoo. Summer resident; rather common, arriving the first week in May, and remaining until the first of October. Nidification commences about the middle of June, though fresh eggs have been taken as late as the second week in August. It is not uncommon to find a nest that contains a half-fledged young bird, a bird just hatched, a half-incubated egg, and perhaps, also, a fresh egg.

[B 70, R 388, C 428, U 388.]

*Coccyzus erythrophthalmus* (Wils.) Black-billed Cuckoo. Summer resident; not as common as *C. americanus*. Usually nests in bushes in damp woodland, and, like the last species, lays its eggs at irregular intervals.

SUBORDER **ALCYONES**. KINGFISHERS.FAMILY **ALCEDINIDÆ**. KINGFISHERS.GENUS **CERYLE** Boie.SUBGENUS **STREPTOCERYLE** Bonaparte.

[B 117, R 382, C 423, U 390.]

*Ceryle alcyon* (Linn.). Belted Kingfisher. Summer resident; common from March to November. Its eggs are usually laid the last week in May.

ORDER **PICI**. WOODPECKERS, WRYNECKS, ETC.FAMILY **PICIDÆ**. WOODPECKERS.GENUS **DRYOBATES** BOIE.[B 74, *part*, R 360, C 438, *part*, U 393.]

*Dryobates villosus* (Linn.). Hairy Woodpecker. Resident; rather common. The eggs are laid about the last of April. In the winter this bird has been observed feeding upon fresh beef, which it picked from bones brought into the yard by dogs.

[B 76, R 361, C 440, U 394.]

*Dryobates pubescens* (Linn.). Downy Woodpecker. Resident; common. "This is the little spotted woodpecker that bores the apple trees so persistently, but it does not appear to hurt them. In declaring war against woodpeckers, the agriculturist will do well to discriminate between the somewhat injurious and the highly beneficial species." (*Coues*).

GENUS **SPHYRAPICUS** BAIRD.

[B 85, R 369, C 446, U 402.]

*Sphyrapicus varius* (Linn.). Yellow-bellied Sapsucker. Summer resident; rather common, arriving the second week in April. This species excavates its nest in the limb of some tree in the heavy timber along the water-courses. Nidification commences usually about the last of May. A number of nests have been examined near Des Moines; one of these was not more than ten feet from the ground, while another was over seventy-five feet. The latter was built in the living wood of an elm, and was carefully watched from the time the nest was begun until it was finished.

GENUS **CEOPHLÆUS** CABANIS.

[B 90, R 371, C 432, U 405.]

*Ceophlæus pileatus* (Linn.). Pileated Woodpecker. Resident; not uncommon in the heavy timber along the watercourses; rare in other localities. It is becoming more and more rare each year, and will soon disappear with the heavy forest tracts.

GENUS **MELANERPES** SWAINSON.SUBGENUS **MELANERPES**.

[B 94, R 375, C 453, U 406.]

*Melanerpes erythrocephalus* (Linn.). Red-headed Woodpecker. Summer resident; quite common. Arrives about the first of May and remains until the middle of September. Breeds the first week in June. Occasionally winters. One was seen one cold day in January, at Des Moines. At Iowa City a pair was noticed on the University campus nearly every day during the winters of 1885-86, and 1886-87.

## SUBGENUS CENTURUS SWAINSON.

[B 91, R 372, C 450, U 409.]

*Melanerpes carolinus* (Linn.). Red-bellied Woodpecker. Resident; rather common. Seen most abundantly in the spring and fall.

## GENUS COLAPTES SWAINSON.

[B 97, R 378, C 457, U 412.]

*Colaptes auratus* (Linn.). Flicker. Resident; abundant. During the season of 1880 more than fifty eggs were taken from the nest of one pair of birds.

## ORDER MACROCHIRES. GOATSUCKERS, SWIFTS, ETC.

## SUBORDER CAPRIMULGI. GOATSUCKERS, ETC.

## FAMILY CAPRIMULGIDÆ. GOATSUCKERS, ETC.

## GENUS ANTROSTOMUS GOULD.

[B 112, R 354, C 397, U 417.]

*Antrostomus vociferus* (Wils.). Whip-poor-will. Summer resident; common in woodland, where it lays its eggs on the ground, among dry leaves.

## GENUS CHORDEILES SWAINSON.

[B 114, R 357, C 399, U 420.]

*Chordeiles virginianus* (Gmel.). Night-hawk. Summer resident; abundant from the first week in May until the first of October. In the cities the eggs are laid on the gravel roofs of buildings. Usually about the middle of September immense numbers pass southward in scattered flocks—hundreds of birds being in sight at once.

## SUBORDER CYPSELI. SWIFTS.

## FAMILY MICROPODIDÆ. SWIFTS.

## SUBFAMILY CHÆTURINÆ. SPINE-TAILED SWIFTS.

## GENUS CHÆTURA STEPHENS.

[B 109, R 351, C 405, U 423.]

*Chætura pelagica* (Linn.). Chimney Swift. Summer resident; abundant from the third week in April until the middle of September. Breeds about the tenth of June. In towns it is most abundant, and nests in chimneys—some of the large factory chimneys being occupied by hundreds. In other portions of the State, hollow trees are often taken for nesting sites.

## SUBORDER TROCHILI. HUMMING-BIRDS.

## FAMILY TROCHILIDÆ. HUMMING-BIRDS.

## GENUS TROCHILUS LINNÆUS.

[B 101, R 335, C 409, U 428.]

*Trochilus colubris* Linn. Summer resident; common from the second week in May until the last of September. In July, 1881, one of these birds was captured and confined in a room for more than a week. Every day during that time it was offered sugar dissolved in water, of which it appeared quite fond.

## ORDER PASSERES. PERCHING BIRDS.

## SUBORDER CLAMATORES. SONGLESS PERCHING BIRDS.

## FAMILY TYRANNIDÆ. TYRANT FLYCATCHERS.

## GENUS TYRANNUS CUVIER.

[B 124, R 304, C 368, U 444.]

*Tyrannus tyrannus* (Linn.). Kingbird. Summer resident; common from the last week in April to the third week in September. There is a general impression prevailing among agriculturists that this species captures and destroys many honey-bees, but "it destroys a thousand noxious insects for every bee it eats." (*Coues*). Nests in orchards and swampy woodland.

[B 126, R 306, C 370, U 447.]

*Tyrannus verticalis* Say. Arkansas Kingbird. No personal observation has been made on this species in Iowa. Mr. Allen, in his notes on the birds of western Iowa, states that "at Boonesboro a pair of large flycatchers were seen in the timber, which I scarcely doubt were of this species. Having no gun with me at the time, I was unable to get them, and did not meet with them elsewhere."

## GENUS MYIARCHUS CABANIS.

[B 130, R 312, C 373, U 452.]

*Myiarchus crinitus* (Linn.). Crested Flycatcher. Summer resident; common from the first of May to the third week in September. Nests in bird-boxes and cavities in trees.

## GENUS SAYORNIS BONAPARTE.

[B 135, R 315, C 379, U 456.]

*Sayornis phæbe* (Lath.). Phæbe. Summer resident; abundant. Arrives the third week in March, and commences nesting about the middle of April. The nest is placed under bridges, sheds, overhanging

rocks, and similar sites. The eggs of this species are usually recorded as pure *white* and *unmarked*. From the personal examination of nearly two hundred nests, it would seem that at least one-fourth of the eggs were marked with reddish-brown spots. The occurrence of spots upon eggs normally without markings is not unfrequently noticed among the eggs of the common barn-yard fowl; and it is also recorded of the robin and other species.

GENUS *CONTOPUS* CABANIS.

[B 137, R 318, C 380, U 459.]

*Contopus borealis* (Swains.). Olive-sided Flycatcher. Rare; observed only in the spring.

[B 139, R 320, C 382, U 461.]

*Contopus virens* (Linn.). Wood Pewee. Summer resident; common from the 10th of May until September. Its note may be heard at almost any time after its arrival, in the woodland along the streams.

GENUS *EMPIDONAX* CABANIS.

[B 144, R 322, C 388, U 463.]

*Empidonax flaviventris* Baird. Yellow-bellied Flycatcher. Migratory; not common. Appears the first week in May.

[B 143, R 324, C 384, U 465.]

*Empidonax acadicus* (Gmel.). Acadian Flycatcher. Summer resident; not common. Several nests have been taken near Des Moines during the past few years. One found May 26, 1881, was composed of dry grasses, catkins, and spider-webs, and was pendant. It was attached to the forks of a small horizontal branch, about seven feet from the ground.

[B 140, R 325 a, C 385, U 466 a.]

*Empidonax pusillus traillii* (Aud.). Traill's Flycatcher. Migratory; common. Appears the second week in May, frequenting the willows along the streams. Breeds in the northern portions of the State.

[B 142, R 326, C 387, U 467.]

*Empidonax minimus* Baird. Least Flycatcher. Migratory; common. Arrives the first week in May. Breeds "in large numbers in Mahaska County." (Tripp.)

SUBORDER *OSCINES*. SONG BIRDS.FAMILY *ALAUDIDÆ*. LARKS.GENUS *OTOCORIS* BONAPARTE.

[B 302, R 300, C 82, U 474.]

*Otocoris alpestris* (Linn.). Horned Lark. Winter visitant; not uncommon in eastern Iowa.

[B —, R —, C —, U 474 b.]

*Otocoris alpestris praticola* Hensh. Prairie Horned Lark. Resident; common. Breeds in the open fields and prairies. The eggs are laid late in March, even before the snow has melted. Two broods are usually raised in a season.

FAMILY CORVIDÆ. CROWS, JAYS, MAGPIES, ETC.

SUBFAMILY GARRULINÆ. MAGPIES AND JAYS.

GENUS CYANOCITTA STRICKLAND.

[B 434, R 289, C 349, U 477.]

*Cyanocitta cristata* (Linn.). Blue Jay. Resident; abundant. Notorious for its thievish propensities. The writer has seen the larger part of a bushel of hazel nuts disappear from a shed-roof in a very short time—all carried away by the jays. During the spring and fall large flocks of these birds—often three or four hundred in number—have been observed flying northward and southward, with every indication that they were migrating. In nest-building, this species has been observed to procure materials by breaking off with its beak the dead twigs of a tree in the proximity of the one in which the half-completed nest was situated.

SUBFAMILY CORVINÆ. CROWS.

GENUS CORVUS LINNÆUS.

[B 426, R 282, C 340, U 488.]

*Corvus americanus* Aud. American Crow. Resident; abundant. The eggs are laid about the first of April. The young taken from the nest form very interesting pets.

FAMILY ICTERIDÆ. BLACKBIRDS, ORIOLES, ETC.

GENUS DOLICHONYX SWAINSON.

[B 399, R 257, C 312, U 494.]

*Dolichonyx oryzivorus* (Linn.). Bobolink. Summer resident; common throughout central and northern Iowa. Arrives about the first of May.

GENUS MOLOTHRUS SWAINSON.

[B 400, R 258, C 313, U 495.]

*Molothrus ater* (Bodd.). Cowbird. Summer resident; abundant. Arrives from the middle of March to April, and remains until October. "Gregarious, polygamous, parasitic." (Coues.) Before the smaller species of birds have commenced to build their nests, many of the females of *M. ater* are compelled to deposit their eggs in the nests of

some of the larger species: brown thrasher, chewink, rose-breasted grosbeak, blue bird, bronzed grackle, etc. As many as six eggs of *M. ater* have been taken at one time from the nest of a wood thrush.

GENUS *XANTHOCEPHALUS* BONAPARTE.

[B 404, R 260, C 319, U 497.]

*Xanthocephalus xanthocephalus* (Bonap.). Yellow-headed Blackbird. Summer resident; not common in the eastern portion of the State; abundant in central and northern portions. Arrives the third week in April, and commences breeding about a month later. Ample opportunity for studying the breeding habits of this species is afforded by a large prairie marsh a few miles from Des Moines. A colony of several hundred of these birds has occupied this marsh for a number of seasons past. Long before a single bird is seen the harsh, unpleasant chorus, issuing from the middle of the marsh and heard amidst the notes of thousands of red-wings, proclaims the arrival of the yellow-head. Nidification begins three or four weeks later. The nest is a large, bulky structure, composed chiefly of the dry leaves and small stems of Indian rice (*Zizania aquatica*), and lined with the tops of the same plant; it is loosely woven around the standing rice stems, or often around the growing stems of the bulrush (*Scirpus validus*), and is placed three or four feet above the water. The eggs are four or five in number, often only three, and occasionally six.

GENUS *AGELAIUS* VIRILLOT.

[B 401, R 261, C 316, U 498.]

*Agelaius phoeniceus* (Linn.). Red-winged Blackbird. Summer resident; abundant. Arrives about the middle of March and departs about the middle of November. Its arrival is heralded by the appearance of a few males, in company with the rusty blackbirds; a few days later large flocks arrive. In the fall it associates promiscuously with the rusty blackbird and bronzed grackle, together forming flocks of many thousands, which wander about in woodland and corn-fields until the departure for the south. The nest is usually placed in a tuft of sedges a few inches above the water in a marsh; but often situated ten or fifteen feet from the ground, in willows bordering the streams. This species has been taken at Charles City, in December.

GENUS *STURNELLA* VIRILLOT.

[B 406, R 263, C 320, U 501.]

*Sturnella magna* (Linn.). Meadow-lark. Summer resident; abundant, arriving the middle of March.

[B 407, R 264, C 322, U 501 b.]

*Sturnella magna neglecta* (Aud.). Western Meadow-lark. Mr. Tripp notices it from southern Iowa. In Floyd County it is more common than *S. magna*, and frequents the outskirts of the towns, while *S. magna* is usually found on the prairies.

GENUS *ICTERUS* BRISSONSUBGENUS *PENDULINUS* VIEILLOT.

[B 414, R 270, C 324, U 506.]

*Icterus spurius* (Linn.). Orchard Oriole. Summer resident; common. Arrives the first week in May and remains until September. Nests in orchards and open woodland.

SUBGENUS *YPHANTES* VIEILLOT.

[B 415, R 271, C 326, U 507.]

*Icterus galbula* (Linn.). Baltimore Oriole. Summer resident; common from the first of May until September. Its pensile nest is usually attached to the twigs of a drooping branch of some tree. On one occasion bits of twine and strips of colored cloth were placed in the grass near a tree in which a pair of orioles were building a nest, and in the course of a few days we were in possession of a very interesting specimen of avian architecture, gay with many colors.

GENUS *SCOLECOPHAGUS* SWAINSON.

[B 417, R 273, C 331, U 509.]

*Scolecophagus carolinus* (Müll.). Rusty Blackbird. Spring and fall migrant; abundant from the middle of March to the middle of May, and from the middle of October to the middle of November. In woodland when alarmed a whole flock, numbering several hundred, will fly to the top of some tall tree and begin a loud, harsh vocalization, which may be heard for a great distance.

GENUS *QUISCALUS* VIEILLOT.SUBGENUS *QUISCALUS*.

[B —, R 278 b, C 337, U 511 b.]

*Quiscalus quiscula æneus* (Ridgw.). Bronzed Grackle. Summer resident; abundant from the middle of March to the middle of November. In the spring it is not an uncommon sight to see a score or more of these birds following the plow and devouring the grubs and insects that are upturned. In the fall it mingles with the rusty and red-winged blackbirds, frequenting the corn-fields in large flocks.

"The autumnal migrations of *Icteridæ* at Burlington, Iowa, are notable chiefly on account of the immense flocks of certain blackbirds which

congregate in that vicinity. The extensive swamps bordering the Mississippi River above and below the city, on the Illinois side, form an especially favorable rendezvous for these birds, three species of which are represented nearly in equal numbers—*Quiscalus quiscula æneus*, *Scolecophagus carolinus*, and *Agelaius phœniceus*. During September and October, the corn-fields of Iowa are visited by countless numbers of these black marauders, which wander about in mixed flocks of several thousands, passing the day in the fields, and the nights in the woodland or marshes. And it is during this period that so many thousands are poisoned and killed by the farmers. About the first of October, these birds begin to appear from the more northern districts, pouring into the Burlington swamps in myriads, and by the middle of the month immense numbers have here collected. Just before sunrise vast flocks begin to rise out of the swamps and radiate in all directions towards the inland corn-fields, where they spend the day, returning again to the swamps before sunset. These flocks are often a quarter of a mile in width, and are more than an hour in passing—a great, black band slowly writhing like some mighty serpent across the heavens, in either direction its extremities lost to view in the dim and distant horizon. Not unfrequently three or four such vast flocks are in sight at one time. How far away from their night retreats they wander each day has not been observed; an hour and a half before sunset, twelve miles away from the river, the mighty armies of blackbirds are still seen coming over distant hills and directing their courses toward the marshes. It is evident, however, that many miles are daily traversed in their journeys to and from their feeding grounds. Making liberal deductions for any possibility of over-estimating, the numerical minimum of individuals in a single flock cannot be far from twenty millions.\*

FAMILY FRINGILLIDÆ. FINCHES, SPARROWS, ETC.

GENUS COCCOTHAUSTES BRISSON.

SUBGENUS HESPERIPHONA BONAPARTE.

[B 303, R 165, C 189, U 514.]

*Coccothraustes vespertina* (Coop.). Evening Grosbeak. Winter visitant; rare, and rather erratic, though its appearance is more regular in the northern than in other portions of the State. It arrives from the north about the last of November, and remains until May. A flock of these birds spent the winter of 1886–7 in the vicinity of Iowa City, and chiefly around the State University. The movements of a flock of more than one hundred individuals which livened the campus for nearly ten weeks, were watched with deep interest. During its

\*Blackbird Flights at Burlington, Iowa.—Charles R. Keyes. The Auk, Vol. V., p. 207.

sojourn, twenty fine specimens were secured, several of which were dissected for the purpose of further determining the nature of the food of this interesting species. "About the middle of December several were observed a short distance north of the city, but it was not until the first of February that they began to court the society of man and appear in the principal streets. When first noticed in the town, there was a flock of twenty-five or thirty feeding upon the *samaræ*, or key-fruits, which were still attached to the branches of the box-elders. The kernels of the keys were quickly and adroitly removed, and the refuse allowed to fall upon the snow beneath, which, after a short time, was thickly strewn with the remains of the feast. On the 23d of February, a flock of over one hundred suddenly appeared on the University campus, and, after remaining an hour or more, departed. From this date until the 30th of April—nearly ten weeks—it was their custom to visit the campus and remain until noon, when they would fly away and spend the remainder of the day elsewhere. During their stay, the food of these birds consisted chiefly of the *samaræ* of the box-elders and sugar maples, the young leaf-buds of various trees, seeds, and grain; to obtain the latter the whole flock would often alight on the ground and eagerly devour the scattered grain. As spring advanced they were usually seen, especially early in the morning, in the top of some tree, singing or chattering noisily, thus attracting the attention of nearly every passer-by. Their loud, clear, rather harsh, piping notes, uttered in concert, reminded one forcibly of the familiar chorus of the rusty blackbirds in the spring, and have also been likened to the shrill piping rising from some frog-pond on a quiet summer evening."\* This species has appeared in the vicinity of Iowa City on two different occasions, February, 1884, and the winter of 1886-7. It is also reported from Charles City in March; Grinnell, December, April, and May; and at Burlington in the southeastern part of the State.

GENUS *PINICOLA* VIEILLLOT.

[B 304, R 166, C 190, U 515.]

*Pinicola enucleator* (Linn.). Pine Grosbeak. Winter visitant; rare. During the winter of 1878-9, a few small flocks appeared in the vicinity of Charles City.

GENUS *CARPODACUS* KAUP.

[B 305, R 168, C 194, U 517.]

*Carpodacus purpureus* (Gmel.). Purple Finch. Spring and fall migrant; abundant. In central Iowa it usually appears about the last of

\* C. R. Keyes, Occurrence of *Coccothraustes vespertina* in Iowa. The Auk, Vol. V., p. 114. Abstract of a paper read at the Fifth Meeting of the American Ornithologist's Union, held at Boston, October 11-13, 1887.

February, and remains until May; the fall sojourn is from the middle of October to the middle of December. It frequents orchards and open woodland.

GENUS **LOXIA** LINNÆUS.

[B 318, R 172, C 199, U 521.]

*Loxia curvirostra minor* (Brehm.). American Cross-bill. An irregular winter visitor. Generally seen from the middle of October until the first week in May. At Charles City, during the spring of 1878, it appeared in large numbers, remaining until the end of the first week in May. In July of the same year, a flock was also noticed in Floyd County.

[B 319, R 173, C 198, U 522.]

*Loxia leucoptera* Gmel. White-winged Cross-bill. Rare; usually noticed only in mid-winter.

GENUS **ACANTHIS** BECHSTEIN.

[B 320, R 179, C 207, U 528.]

*Acanthis linaria* (Linn.). Red-poll. Winter visitant; irregular, but usually abundant during its sojourns. In February it has been noticed feeding upon the seeds of the rag-weed (*Ambrosia*).

GENUS **SPINUS** KOCH.

[B 313, R 181, C 213, U 529.]

*Spinus tristis* (Linn.). American Goldfinch. Resident; abundant. In winter it frequents the fields and borders of woodland, feeding upon the seeds of the rag-weed. The flocks often contain several hundred birds, but as warm weather approaches their number daily diminishes, until about the middle of June, when there are but few individuals remaining in the company. It breeds in July and August.

[B 317, R 185, C 212, U 533.]

*Spinus pinus* (Wils.). Pine Siskin. Winter visitant; not common.

GENUS **PLECTROPHENAX** STEJNEGER.

[B 325, R 186, C 219, U 534.]

*Plectrophenax nivalis* (Linn.). Snowflake. Winter sojourner; confined almost exclusively to the fields and prairies. It is quite common in the northern parts of the State; rare in southern portion, where it is seen only during severe winters.

GENUS **CALCARIUS** BECHSTEIN.

[B 326, R 187, C 220, U 536.]

*Calcarius lapponicus* (Linn.). Lapland Longspur. Winter visitor; abundant. Associates with *Plectrophenax nivalis*, and is more common than that species.

[B 327, R 188, C 221, U 537.]

*Calcarius pictus* (Swains.). Smith's Longspur. Migratory; common. Appears about the middle of April, in companies of fifty or more, and frequents old "stubble" fields. In crossing a field, a bird suddenly darts out from nearly under the feet of the observer, and flies upward, nearly perpendicularly, almost out of sight. A few steps further, and a couple of more do likewise, and, shortly after, again, several others. After a few minutes they drop to the ground, three or four hundred feet in advance. As they rise they give utterance to their peculiar notes, and, on alighting, begin feeding again, unconcernedly. By cautiously advancing, several may be secured. Upon dissection, the food is found to consist of grain and seeds of various weeds.

GENUS **POOCÆTES** BAIRD.

[B 337, *part*, R 197, C 232, U 540.]

*Poocetes gramineus* (Gmel.). Vesper Sparrow. Common migrant, arriving the first week in April. Doubtless also a summer resident.

GENUS **AMMODRAMUS** SWAINSON.

SUBGENUS **PASSERCULUS** BONAPARTE.

[B 332, R 193 *a*, C 227, U 542 *a*.]

*Ammodramus sandwichensis savanna* (Wils.). Savanna Sparrow. Migratory; common. Arrives early in April. Doubtless breeds within the limits of the State. It has been observed during the summer in the prairie sloughs of Polk County.

SUBGENUS **COTURNICULUS** BONAPARTE.

[B 338, R 198, C 234, U 546.]

*Ammodramus savannarum passerinus* (Wils.). Grasshopper Sparrow. Summer resident; common from the middle of April until October. Breeds in the fields and prairies.

[B 339, R 199, C 236, U 547.]

*Ammodramus henslowii* (Aud.). Henslow's Sparrow. Summer resident; common. Arrives about the same time as the last species, with which it associates.

[B 340, R 200, C 237, U 548.]

*Ammodramus leconteii* (Aud.). Leconte's Sparrow. Rather common. Seen usually in the spring, in the grass of sloughs near woodland.

GENUS **CHONDESTES** SWAINSON.

[B 344, *part*, R 204, C 281, *part*, U 552.]

*Chondestes grammacus* (Say). Lark Sparrow. Summer resident; common from the middle of April until October. In the spring it is

first noticed along the roadsides and in fields, where, a little later in the season, it breeds.

GENUS *ZONOTRICHIA* SWAINSON.

[B 348, R 205, C 280, U 553.]

*Zonotrichia querula* (Nutt.). Harris's Sparrow. Migratory; common. In central Iowa it appears the third week in April, and sojourns until the middle of May. In the fall it is usually noticed from the middle to the last of October. During the latter part of September, 1880, it was very abundant at Spirit Lake, Dickinson County.

[B 345, R 206, C 276, U 554.]

*Zonotrichia leucophrys* (Forst.). White-crowned Sparrow. Migratory; rather common. Frequents open woodland.

[B 349, R 209, C 275, U 558.]

*Zonotrichia albicollis* (Gmel.). White-throated Sparrow. Migratory; abundant from the middle of April to the middle of May, and from the middle to the last of October.

GENUS *SPIZELLA* BONAPARTE.

[B 357 *part*, R 210, *part*, C 268, *part*, U 559.]

*Spizella monticola* (Gmel.). Tree Sparrow. Abundant migrant and common winter resident from October to April. Associates with the juncos and goldfinches.

[B 359, *part*, R 211, C 269, U 560.]

*Spizella socialis* (Wils.). Chipping Sparrow. Summer resident; very common from March until the middle of October. Perhaps the most familiar of our sparrows. Builds its nest in evergreens and vines in door-yards; and in hawthorn and similar trees in open woodland.

[B 360, R 212, C 272, U 561.]

*Spizella pallida* (Swains.). Clay-colored Sparrow. Migratory; common. Arrives early in May and frequents open woodland.

[B 358, R 214, C 271, U 563.]

*Spizella pusilla* (Wils.). Field Sparrow. Summer resident; common from early in April to October. The nest is usually placed in a tuft of grass, and is composed of dried grasses which are interwoven with the living grass, and lined with hair. Eggs usually four in number.

GENUS *JUNCO* WAGLER.

[B 354, R 217, C 261, U 567.]

*Junco hyemalis* (Linn.). Slate-colored Junco. Spring and fall migrant; abundant. Many remain from October to April.

GENUS *PEUCEA* AUDUBON.[B 370, *part*, R 226 a, C 252 U, 575 a.]

*Peucea æstivalis bachmanii* (Aud.). Bachman's Sparrow. This species is entered here upon the following data: On the 2d of June, 1884, Mr. J. B. Green, of Des Moines, while collecting, several miles east of the city, passed through several fields in search of the eggs of the yellow-winged sparrow, and other ground-nesting species which were known to breed there. Mr. Green says: "I had passed through a corn-field and had just entered a field of clover, when I started from nearly under my feet, a sparrow somewhat larger than a yellow-winged, but not having my gun with me, I was unable to secure it. After a brief search I discovered a nest containing five white eggs, which being without markings, I knew did not belong to a *Coturniculus*; but not wishing to take the eggs without, at least, a good look at the bird, I continued hunting for other nests, while awaiting its return to the nest. After a time I returned, with more caution than before, and again flushed the bird, but this time I succeeded in noting more carefully its appearance, which, on arriving home, and taking into consideration the eggs, corresponded with *Peucea æstivalis bachmanii*. The nest was placed in a slight depression at the base of a tuft of clover, and was composed of dry grasses, lined with finer materials and a few hairs."

Two of the eggs were sent to Professor J. A. Allen for further identification. Mr. Allen replied:

"I have compared the eggs with those of *Peucea æstivalis*, *P. cassini*, and *P. carpalis*, and with those other species laying white, or whitish eggs. Taking into account the situation of the nest—on the ground—and the geographical distribution of the other species of *Peucea*, and the few other species of finch which lay white eggs, I should say that your conclusions that these eggs are those of *P. æstivalis bachmanii* is highly probable—in fact, almost beyond question. I find, however, that the eggs sent are absolutely indistinguishable from those of *P. carpalis*, to which, of course, for geographical reasons, they cannot belong; and they are also indistinguishable from eggs of *Poospiza* (*Amphispiza*) *belli*, which is a species likewise out of the question, for geographical reasons. The eggs of *P. æstivalis* are a little larger, and a purer, glossy white, as are also those of *P. cassini*, differing from the eggs of both of these species quite markedly in both of these particulars. Your eggs have a slight bluish cast, and in this respect, and in size, also similar to the eggs of *Cyanospiza cyanea*. Had not the nest been placed on the ground, I should have said that they were eggs of this species. If *P. æstivalis bachmanii* occurs with you, it would

seem that they *must* be the eggs of that bird. And the only question I can see about them is whether they may not be those of *Cyanospiza cyanea*; but the position of the nest seems to render this improbable."

GENUS *MELOSPIZA* BAIRD.

[B 363, R 231, C 244, U 581.]

*Melospiza fasciata* (Gmel.). Song Sparrow. Migratory; abundant. Resident in small numbers through the summer.

[B 368, R 234, C 242, U 583.]

*Melospiza lincolni* (Aud.). Lincoln's Sparrow. Migratory; common from the 20th of April to the middle of May, and from the middle to the last of October. It frequents the underbrush in open woodland, where it is found in scattered flocks, in company with other sparrows.

[B 369, R 233, C 243, U 584.]

*Melospiza georgiana* (Lath.). Swamp Sparrow. Common spring and fall migrant, arriving about the middle of April, and in the autumn in September. Doubtless breeds in the State, in wet and marshy ground.

GENUS *PASSERELLA* SWAINSON.

[B 374, R 235, C 282, U 585.]

*Passerella iliaca* (Merr.). Fox Sparrow. Spring and fall migrant; abundant. Arrives the last week in March, and remains about a month; in the fall it is noticed from the first to the last week in October. This species, in size and color, resembles some of our thrushes, and, as its habits and haunts are not unlike those of the *Turdidae*, it might readily be mistaken, at first sight, for a member of that family. Its arrival is first made known by the appearance of a few individuals in open woodland, but in three or four days it becomes common and wanders about in scattered flocks.

GENUS *PIPILO* VIEILLIOT.

[B 391, R 237, C 301, U 587.]

*Pipilo erythrophthalmus* (Linn.). Towhee. Summer resident; common; arriving the last week in March, and departing in October. It frequents the open woodland, where it usually nests on the ground, under some bush, but sometimes the nest is placed in a shrub.

GENUS *CARDINALIS* BONAPARTE.

[B 390, R 242, C 299, U 593.]

*Cardinalis cardinalis* (Linn.). Cardinal. Not common. Only occasionally seen in central Iowa, but noticed more often in the southern portion of the State. It has been taken in the latter part of December, at Iowa City.

GENUS **HABIA** REICHENBACH.

[B 380, R 244, C 289, U 595.]

*Habia ludoviciana* (Linn.). Rose-breasted Grosbeak. Summer resident; common, arriving the last of April, and remaining until the last of September. It nests in orchards and open woodland in the vicinity of streams. The nest is placed at various heights—from eight to forty feet from the ground—usually from ten to twenty. The eggs are generally four in number, often three, and occasionally five. In this vicinity it has never been found nesting in bushes, as has been reported from many other localities. A fine albino of this species was taken at Des Moines in July, 1885. The elegant plumage and melodious song makes this species very desirable as a cage bird.

GENUS **PASSERINA** VIEILLOT.

[B 387, R 248, C 295, U 598.]

*Passerina cyanea* (Linn.). Indigo Bunting. Summer resident; common from the first week in May until September.

GENUS **SPIZA** BONAPARTE.

[B 378, R 254, C 287, U 604.]

*Spiza americana* (Gmel.). Dickcissel. Summer resident; abundant from the last of April until October. It is one of the most familiar species of the fields and meadows, where it may be seen perched upon the top of some weed or small tree, uttering at short intervals its monotonous notes.

FAMILY **TANAGRIDÆ**. TANAGERS.GENUS **PIRANGA** VIEILLOT.

[B 220, R 161, C 154, U 608.]

*Piranga erythromelas* Vieill. Scarlet Tanager. Summer resident; common. In central Iowa it arrives about the last of April, and remains until the middle of September. A rather retiring bird, usually met with in the timber bordering the streams. Breeds about the last of May. The nest is usually placed upon a horizontal limb, thirty or forty feet from the ground, and almost invariably contains, besides its own eggs, from one to three of the cowbird (*Molothrus ater*).

[B 221, R 164, C 155, U 610.]

*Piranga rubra* (Linn.) Summer Tanager. Rare. During the season of 1880, this species was observed at Des Moines, and three nests with eggs taken, but since then has not been noticed in that vicinity. One of the nests taken July 23d, contained two eggs about half incubated. The nest was placed on the horizontal limb of an elm tree in a rather open grove, and was about fifteen feet from the ground.

Eggs similar to those of *P. erythromelas*. Both birds came within a dozen feet of the intruder, and were distinctly seen. The absence of the black of the tail and wings of the male and the whitish bill were points noticed as unequivocally distinguishing this species from its near relative. The other two nests each contained three eggs, and were taken in the immediate vicinity of the one just mentioned.

FAMILY HIRUNDINIDÆ. SWALLOWS.

GENUS PROGNE BOIE.

[B 231, R 152, C 165, U 611.]

*Progne subis* (Linn.). Purple Martin. Summer resident; abundant. In central Iowa it usually arrives the last week in March, and departs before the middle of September. The eggs are laid the last of May. After the young are fledged the birds assemble in flocks, usually selecting some large dead tree as a place of rendezvous, the young birds remaining most of the time on the tree, and are fed by the old ones. This is continued until the young are able to take extended flights. They constantly increase in numbers until they depart for the south. A marked instance of this kind occurred at Des Moines in 1884. Towards the last of August, the martins began to gather around the spire of the First Methodist Episcopal Church. Their numbers daily increased until there were many hundreds. For several days the spire was literally black with the birds clinging to the sides and to every projection that afforded them a support. Many were continually dropping off and sailing away for a short flight, while others took possession of the places vacated. They remained in this way for several days, and then suddenly took their departure—for the next day not a bird was seen. After the flock had disappeared but few martins were noticed, and they were stragglers from elsewhere.

GENUS PETROCHELIDON CABANIS.

[B 226, R 153, C 162, U 612.]

*Petrochelidon lunifrons* (Say.). Cliff Swallow. Summer resident; abundant from the first week in May until September. It nests in large colonies, under the eaves of barns and old mills. Nidification commences about the 20th of May. It is frequently noticed flying about over the prairies, far away from any habitation.

GENUS CHELIDON FORSTER.

[B 225, R 154, C 159, U 613.]

*Chelidon erythrogaster* (Bodd.). Barn Swallow. Summer resident; common, but apparently somewhat irregular in its distribution. Arrives the middle of April, and remains until the middle of September. The

nest is attached to the rafters of old barns, or is placed under a bridge. The eggs are laid the last week in May. In the spring when it first arrives, it is seen skimming over the surface of ponds in company with other swallows, and is not unfrequently noticed flying over the fields at some distance from dwellings.

GENUS **TACHYCINETA** CABANIS.

[B 227, R 155, C 160, U 614.]

*Tachycineta bicolor* (Vieill.). Tree Swallow. Summer resident; rather common. Arrives about the first of May, and departs about the middle of September. Nests in cavities in trees, and boxes. In the spring it appears in company with the barn swallow.

GENUS **CLIVICOLA** FORSTER

[B 229, R 157, C 163, U 616.]

*Clivicola riparia* (Linn.). Bank Swallow. Summer resident; breeds abundantly in all parts of the State. A few miles above Muscatine a large colony of these birds occupies the perpendicular side of a deep excavation in a hill-side; the bank is literally honeycombed, and thousands of swallows flying about reminds one, at a distance, of a swarm of bees. Considerable confusion appears to exist among many observers, who confound this with the following species.

GENUS **STELGIDOPTERYX** BAIRD.

[B 230, R 158, C 164, U 617.]

*Stelgidopteryx serripennis* (Aud.). Rough-winged Swallow. Summer resident; abundant, arriving about the middle of April. In central Iowa, especially in Polk and the contiguous counties, this species is quite abundant, almost to the exclusion of the bank swallow. The nests are usually built in the alluvial banks of the streams, or in the sides of gravel pits and in road-cuts. Several years ago, three nests were taken in a cut which afforded a bank less than three feet in height. In the spring after its arrival, it may be seen flying about in the vicinity of the banks which it has selected for its future home. Usually there are ten to fifty or more pair occupying, with a few bank swallows, a cliff on a bend in a river. About the first or second week in May they commence excavating, for a nest, a hole to the depth of two or three feet. At the terminus of the excavation is placed the nest, which is usually composed of bits of hay and grass taken from a barn-yard. By the first of June the full complement of eggs—from five to seven—is laid; the period of incubation is about two weeks. A little careful observation will enable almost any one to distinguish between this species and preceding, even when on the wing and at some distance.

FAMILY **AMPELIDÆ**. WAX-WINGS, ETC.SUBFAMILY **AMPELINÆ**. WAX-WINGS.GENUS **AMPELIS** LINNÆUS.

[B 232, R 150, C 166, U 618.]

*Ampelis garrulus* Linn. Bohemian Wax-wing. Winter visitant; rather rare. During the winter of 1879-'80 large flocks of these birds visited the north-west. They came familiarly about the towns, feeding upon the berries of the mountain ash.

[B 233, R 151, C 167, U 619.]

*Ampelis cedrorum* (Vieill.). Cedar Wax-wing. Spring and fall migrant; abundant, and resident in small numbers throughout the year. In the fall it is noticed in abundance towards the last of October, feeding upon berries, with the juice of which its plumage, at this season, is much soiled. In the spring it is usually seen in small flocks towards the last of March or early in April. It appears in the orchards, feeding upon the apples which happen to be left upon the trees, and frequently alighting on the ground below and gorging itself with the decaying fruit. At Des Moines it is observed all the year. Nesting is postponed until late in the season, seldom being commenced before the first of July. Eggs have been taken at Iowa City, Charles City, and other localities in the State.

FAMILY **LANIIDÆ**. SHRIKES.GENUS **LANIUS** LINNÆUS.

[B 236, R 148, C 186, U 621.]

*Lanius borealis* Vieill. Northern Shrike. Winter resident. Not uncommon from the last of October to March. When seen, it is usually solitary, and perched upon the topmost twig of some tree along roadsides. This and the next species are often confounded, and it has several times been reported as breeding within the limits of the State.

[B 238, R 149 a, C 188, U 622 a.]

*Lanius ludovicianus excubitorides* (Swains.). White-rumped Shrike. Summer resident; rather common. Begins nesting about the last of April; probably raising two broods in a season. On several occasions the full complement of eggs has been taken in the middle of June, after the earlier birds of the season are fledged and able to take care of themselves. The osage orange hedges are favorite nesting sites for this species. The nest is rather large, composed of sticks, twigs, leaves, hair, and an abundance of feathers. The eggs are usually six in number. When the young are fledged, it is not uncommon to see the whole

family of seven or eight perched upon the telegraph wires, or hunting in company along a hedge.

FAMILY VIREONIDÆ. VIREOS.

GENUS VIREO VIEILLLOT.

SUBGENUS VIREOSYLVA BONAPARTE.

[B 240, R 135, C 170, U 624.]

*Vireo olivaceus* (Linn.). Red-eyed Vireo. Summer resident; rather common. Breeds in June. Its beautiful, pendulous nest is attached to the horizontal limb of some forest tree. The nest of this species is one which the cow-bird especially selects as a repository for its parasitic eggs.

[B 244, R 138, C 173, U 626.]

*Vireo philadelphicus* (Cass.). Philadelphia Vireo. Migratory; common; arriving the second week in May. It first appears in scattered companies, moving in leisurely flights through the tops of the trees along the water-courses, and associating with various species of warblers. In the fall it appears about the first of September.

[B 245, R 139, 139 a, C 174, 175, U 627.]

*Vireo gilvus* (Vieill.). Warbling Vireo. Common migrant and summer resident. Arrives about the first week in May, and remains until September. Nests in the cottonwoods and maples that grow along the country roadsides and the streets and gardens in towns.

SUBGENUS LANIVIREO BAIRD.

[B 252, R 140, C 176, U 628.]

*Vireo flavifrons* Vieill. Yellow-throated Vireo. Spring and fall migrant; common. Also summer resident. It appears about the first week in May, and departs about the first of September. At Des Moines it is a very rare summer resident—only one nest having been taken. This one was discovered on the 25th of June, 1881, in a ravine a short distance west of the city limits. The nest was pendulous—like the structures of the other species of *Vireo*—dotted over with little balls of cotton-like material and spider-webs. It was attached to the forks of a horizontal branch of a large white oak, some twelve feet from the main trunk, and twenty feet from the ground. It contained two newly-hatched young, and one egg with a well-developed embryo. The female was very courageous, and, though the branch on which the nest was situated was shaken quite violently several times, remained on her treasures so long that she barely escaped capture by the intruder. As soon as his hand was withdrawn, she was back again on her nest.

The male was not as brave, but kept at a safe distance, yet appearing very solicitous and restless while the nest was being disturbed.

[B 250, R 141, C 177, U 629.]

*Vireo solitarius* (Wils.). Blue-headed Vireo. Migratory; common. Arrives the first week in May, and passes southward the first of September. During the migratory periods it associates with various warblers and several species of its own genus.

SUBGENUS VIREO VIEILLOT.

[B 248, R 143, C 181, U 631.]

*Vireo noveboracensis* (Gmel.). White-eyed Vireo. Rare. Prof. H. W. Parker writes that he has taken it at Grinnell.

[B 246, R 145, C 183, U 633.]

*Vireo bellii* Aud. Bell's Vireo. Summer resident; common. "This is, perhaps, the most familiar summer resident of the genus. No other woodland bird appears to be so completely satisfied with so narrowly restricted a vertical range as this retiring and unobtrusive little greenlet. Though for the most part unseen, its voluble little melody, earnest and plaintive, ever betrays its presence in every hazel copse and garden. Its neat, pensile nest is suspended from the branchlet of some low bush, and here its eggs, four or five in number, are deposited the last week in May. One nest containing four eggs was found in a small bush situated within eight feet of a railroad track over which cars were passing continually, and, notwithstanding the violent swaying of the bush caused by the strong currents of air created by each rapidly-moving train, the young birds were successfully reared." \*

FAMILY MNIOTILTIDÆ. WOOD-WARBLERS.

GENUS MNIOTILTA VIEILLOT.

[B 167, R 74, 74 a, C 91, 92, U 636.]

*Mniotilta varia* (Linn.). Black and White Warbler. Migratory; quite common; often arriving about the middle of April. and sojourning until the middle of May. In the fall it appears from the first to the third week in September. At Des Moines this species has been observed in June and July, and consequently may be regarded as a summer resident, though not a common one.

GENUS PROTONOTARIA BAIRD.

[B 169, R 75, C 95, U 637.]

*Protonotaria citrea* (Bodd.). Prothonotary Warbler. Summer resident; not uncommon, especially in the eastern part of the State. Arrives during the last week in April.

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\* C. R. Keyes, Iowa Greenlets. Ornithologist and Oologist, Vol. XIII., p. 44.

GENUS *HELMITHERUS* RAFINESQUE.

[B 178, R 77, C 96, U 639.]

*Helmitherus vermicorus* (Gmel.). Worm-eating Warbler. Migratory; not uncommon. In the spring arrives about the last of April, and in the fall about the 10th of September.

GENUS *HELMINTHOPHILA* RIDGWAY.

[B 180, R 79, C 98, U 641.]

*Helminthophila pinus* (Linn.). Blue-winged Warbler. Common migrant, and in part, summer resident. Arrives the first week of May, and remains until September. At Prospect Park, near Des Moines, a nest of this species was discovered on the 11th of June, 1884. The attention of the observer was first attracted by a male of this species moving restlessly about through the trees at the edge of an open field, overgrown with long grass and weeds. After watching the movements of the bird a few minutes, the observer started to cross the field, but when about thirty feet from the woods, a bird flew from almost beneath his feet. A nest containing three eggs was soon disclosed, but, as the identification of the bird was not beyond doubt, the place was visited the next day, and a female of this species captured on the nest. The nest, a beautiful example of avian architecture, was built in the grass at the foot of a weed about three feet high; a broad leaf of the plant spread directly above the little structure, effectually concealing it from view. It was composed of dry oak leaves as a foundation; upon this were numerous rootlets and stems of plants interwoven with the surrounding grass, and lined with finer materials. It contained four fresh eggs—rosy white, before the contents were removed, dotted with spots of reddish-brown, and a few of lavender.

[B 181, R 81, C 102, U 642.]

*Helminthophila chrysoptera* (Linn.). Golden-winged Warbler. Migratory; not common. Taken at Iowa City, and elsewhere in the State.

[B 183, *part*, R 85, *part*, C 106, *part*, U 645.]

*Helminthophila ruficapilla* (Wils.). Nashville Warbler. Spring and fall migrant; abundant. Arrives about the first, and remains until the third, week in May; passes southward in September. It is usually noticed in flocks of forty or fifty, moving leisurely through the tops of the large trees along the streams.

[B 184, *part*, R 86, C 107, U 646.]

*Helminthophila celata* (Say.). Orange-crowned Warbler. Spring and fall migrant; rather common. Arrives the first of May, and remains until the middle of the month; passes southward again the first

week in September. It frequents rather open woodland, and seems to be extremely partial to the hawthorn trees. Its plumage—greenish-yellow, or olive, is nearly the same hue as that of the young foliage of the hawthorn, so that the birds are likely to be passed by unnoticed, unless especially sought for.

[B 185, R 87, C 109, U 647.]

*Helminthophila peregrina* (Wils.). Tennessee Warbler. Migratory; abundant. Arrives the first, and sojourns until the third week in May, passing southward again in September. It is an inconspicuous little species, frequenting the tops of trees, and often associating with the brotherly-love vireo.

GENUS **COMPSOTHTYPIS** CABANIS.

[B 168, R 88, C 93, U 648.]

*Compsothtypis americana* (Linn.). Parula Warbler. Rather common; observed only on migrations. Arrives the first week in May, and passes southward the second week in September.

GENUS **DENDROICA** GRAY.

SUBGENUS **PERISSOGLOSSA** BAIRD.

[B 206, R 90, C 126, U 650.]

*Dendroica tigrina* (Gmel.). Cape May Warbler. Migratory; not common. Arrives the second week in May, and returns in September. A specimen was taken at Iowa City, November 27th, 1886.

SUBGENUS **DENDROICA** GRAY.

[B 203, R 93, C 111, U 652.]

*Dendroica aestiva* (Gmel.). Yellow Warbler. Summer resident; abundant. Arrives the first of May, and departs the first of September. Nests about the third week in May, in low bushes. Eggs, four or five in number. As many as three eggs of the cow-bird have been taken from a single nest of this species.

[B 193, R 94, C 117, U 654.]

*Dendroica caerulescens* (Gmel.). Black-throated Blue Warbler. Migratory; not common. Mr. Trippe also mentions it as having been seen a few times in the spring, in Mahaska County.

[B 194, R 95, C 119, U 655.]

*Dendroica coronata* (Linn.). Myrtle Warbler. Abundant spring and fall migrant, appearing about the middle of April, and remaining three or four weeks; in the fall its sojourn is shorter—from the middle to the last of October. It is one of the first of the warblers to put in its appearance in the spring, and may be seen at almost any place in woodlands during its stay.

[B 204, R 97, C 125, U 657.]

*Dendroica maculosa* (Gmel.). Magnolia Warbler. Spring and fall migrant; common. Arrives the first, and remains until the third week in May; in the fall it is to be seen from the last week in August, to the middle of September. In company with others of its genus, it is usually found feeding in the upper branches of the trees along the water-courses.

[B 201, R 98, C 118, U 658.]

*Dendroica carulea* (Wils.). Cerulean Warbler. Migratory; not common, at least as far as personal observation goes. In his notes on the birds observed in western Iowa, in July, August, and September of 1867, Mr. J. A. Allen states that this species was "quite common at Boonesboro, keeping chiefly in the tops of high trees, and was the only woodland *Dendroica* observed there." Mr. T. M. Trippe, in his notes on the birds of southern Iowa (1872), states that it was "common, and breeds."

[B 200, R 99, C 124, U 659.]

*Dendroica pensylvanica* (Linn.). Chestnut-sided Warbler. Migratory; abundant, arriving the first week in May, and departing before the middle of September. Also a summer resident, not uncommon.

[B 197, R 100, C 123, U 660.]

*Dendroica castanea* (Wils.). Bay-breasted Warbler. Migratory; not common. Arrives the first week in May.

[B 202, R 101, C 122, U 661.]

*Dendroica striata* (Forst.). Black-poll Warbler. Common migrant from the first to the middle of May. It is usually seen among the lower branches of the trees in dark, damp woodland.

[B 196, R 102, C 121, U 662.]

*Dendroica blackburniæ* (Gmel.). Blackburnian Warbler. Migratory; not common. Arrives the first week in May.

[B 189, R 107, C 112, U 667.]

*Dendroica virens* (Gmel.). Black-throated Green Warbler. Common spring and fall migrant, arriving the first of May, and returning in September. Perhaps breeds in the State, inasmuch as it has been noticed several times during the month of June.

[B 208, *part*, R 113, C 132, U 672.]

*Dendroica palmarum* (Gmel.). Palm Warbler. Migratory; abundant. Appears about the 20th of April, and remains until the 10th of May. Its arrival is heralded by the appearance of a few males, which frequent open woodland; a few days later others, comprising both

sexes, appear and proceed leisurely along the water-courses, in company with *D. coronata* and others.

GENUS *SEIURUS* SWAINSON.

[B 186, R 115, C 135, U 674.]

*Seiurus aurocapillus* (Linn.). Oven Bird. Summer resident; common; arriving about the first of May, and remaining until the middle of September. Breeds about the third week in May, in hilly woodland, where, at this season of the year it seldom fails to attract notice by its loud, impetuous cries. The nest is commonly placed in a slight depression in the ground and is arched over, the entrance being at the side. Even thus hidden from observation, it does not escape the keen eyes of the cow-bird, which often deposits its eggs in the nest of this species.

[B 187, *part*, R 116, C 136, U 675.]

*Seiurus noveboracensis* (Gmel.). Water-thrush. Summer resident; not common. Arrives early in May. Usually observed in dark, marshy woodlands. A few miles north of Des Moines, a female of this species was taken in June, 1884; it was feeding young just from the nest.

[B 188, R 117, C 138, U 676.]

*Seiurus motacilla* (Vieill.). Louisiana Water-thrush. Migratory; common; arriving about the middle of April, and passing southward in September. When it arrives in the spring it is noticed about the pools and creeks in low woodland, where it walks about the edge of the water in search of food, and looking, at casual sight, like a little spotted sandpiper, but when startled, flies to some tree near by, and goes through those evolutions of the tail which are characteristic of the wag-tails. A few remain through the summer, and breed.

GENUS *GEOTHLYPIS* CABANIS.SUBGENUS *GEOTHLYPIS* CABANIS.

[B 172, R 120, C 142, U 679.]

*Geothlypis philadelphia* (Wils.). Mourning Warbler. Migratory; rather common in the underbrush and willows on the low lands along the streams. Sojourns in spring until the third week in May.

[B 170, *part*, R 122, *part*, C 141, *part*, U, 681 *a.*]

*Geothlypis trichas occidentalis* Brewst. Western Yellow-throat. Summer resident; common. Arrives the last of April and remains until September. Haunts similar to those of *G. philadelphia*; and also hedges and shrubbery.

GENUS **ICTERIA** VIEILLLOT.

[B 176, R 123, C 144, U 683.]

*Icteria virens* (Linn.). Yellow-breasted Chat. Summer resident; rather common; arriving the first week in May. Haunts the low, open woodlands and thickets along the streams. Nidification commences about the first week in June. The nest is usually placed four or five feet from the ground, in a thickly-foliaged bush. It is composed of dry grasses and leaves, lined with fine grasses and fibres of bark. The eggs number three to five.

GENUS **SYLVANIA** NUTTALL.

[B 211, R 124, C 146, U 684.]

*Sylvania mitrata* (Gmel.). Hooded Warbler. Not common. Mr. Trippe also mentions taking one in Mahaska County, in May.

[B 213, *part*, R 125, C 147, U 685.]

*Sylvania pusilla* (Wils.). Wilson's Warbler. Migratory; common. Arrives the first, and sojourns until the third, week in May; passes southward the second week in September. It is usually noticed in the underbrush in open woodland along the streams.

[B 214, R 127, C 149, U 686.]

*Sylvania canadensis* (Linn.). Canadian Warbler. Spring and fall migrant; not common.

GENUS **SETOPHAGA** SWAINSON.

[B 217, R 128, C 152, U 687.]

*Setophaga ruticilla* (Linn.). American Redstart. Summer resident; common; arriving the first week in May, and departing the second week in September. Nidification commences the first of June.

FAMILY **MOTACILLIDÆ**. WAGTAILS.GENUS **ANTHUS** BECHSTEIN.SUBGENUS **ANTHIUS**.

[B 165, R 71, C 89, U 697.]

*Anthus pensilvanicus* (Lath.). American Pipit. Migratory; common; arriving about the middle of April.

FAMILY **TROGLODYTIDÆ**. WRENS, THRASHERS, ETC.SUBFAMILY **MIMINÆ**. THRASHERS.GENUS **MIMUS** BOIE.[B 253, 253 *a*, R 11, C 15, U 703.]

*Mimus polyglottos* (Linn.). Mocking Bird. Rare. A single specimen was taken at Charles City. Prof. H. W. Parker reports taking it several times at Grinnell.

GENUS **GALEOSCOPTES** CABANIS.

[B 254, R 12, C 16, U 704.]

*Galeoscoptes carolinensis* (Linn.). Cat-bird. Summer resident; abundant from the last of April to October. Nests in orchards and thickets.

GENUS **HARPORHYNCHUS** CABANIS.SUBGENUS **METHRIOPTERUS** REICHENBACH.

[B 261, 261 a, R 13, C 17, U 705.]

*Harporhynchus rufus* (Linn.). Brown Thrasher. Summer resident; abundant from April to the last of September. Nests in hedges and brush-heaps, about the 10th of May. One of our finest songsters. Soon after its arrival, it is noticed in the top of some tall tree, pouring forth its sweetest melodies—often for hours at a time—when, becoming conscious of an audience it suddenly ceases, darts into the thicket below, and is lost to view.

SUBFAMILY **TROGLODYTINÆ**. WRENS.GENUS **SALPINCTES** CABANIS.

[B 264, R 58, C 65, U 715.]

*Salpinctes obsoletus* (Say.). Rock Wren. Not common. Mr. Trippe also notes a specimen taken in Decatur County.

GENUS **TROGLODYTES** VIEILL.SUBGENUS **TROGLODYTES**.

[B 270, 272, R 63, C 74, U 721.]

*Troglodytes aedon* Vieill. House Wren. Summer resident; common; arriving in April, and departing about the middle of September. Raises two or three broods in a season; a nest with fresh eggs has been taken as late as the second week in August. As is well known, its nest is built in all sorts of places. A singular instance came under the observer's notice while examining the nests of a colony of cliff swallows. One of the swallows' nests was noticed to have a number of straws protruding from the entrance. The side of the nest was carefully broken away, and the nest inside extracted. It was composed of a few straws and hairs, and lined with hair and feathers. It contained three eggs of *T. aedon*. The nest was picked to pieces, and the bottom was found to be made of the body of a half-decomposed swallow.

SUBGENUS **ANORTHURA** RENNIE.

[B 273, R 65, C 76, U 722.]

*Troglodytes hiemalis* Vieill. Winter Wren. Migratory; not common.

GENUS **CISTOTHORUS** CAHANIS.SUBGENUS **CISTOTHORUS**.

[B 269, R 68, C 81, U 724.]

*Cistothorus stellaris* (Licht.). Short-billed Marsh Wren. Summer resident; rather common. Breeds in the prairie sloughs.

SUBGENUS **TELMATODYTES** CAHANIS.

[B 268, R 67, 67 a, C 79, 80, U 725.]

*Cistothorus palustris* (Wils.). Long-billed Marsh Wren. Migratory; common. Appears about the first week in May, about the prairie sloughs, where it breeds.

FAMILY **CERTHIIDÆ**. CREEPERS.GENUS **CERTHIA** LINNÆUS.

[B 275, R 55, C 62, U 726.]

*Certhia familiaris americana* (Bonap.). Brown Creeper. Migratory; common; and resident from September to the last of April. A sprightly little creature frequenting woodland, though seldom attracting attention unless carefully sought for. Its plumage is nearly the hue of the bark of many trees, so that it is almost impossible for the eye to follow it after the bird has alighted and commenced ascending a tree. It begins near the bottom, winds its way upward spirally, for, perhaps, forty or fifty feet, when it suddenly drops to the foot of another tree twenty or thirty yards away and repeats the manœuvre, ever and anon picking out some unfortunate insect larva from a crevice in the bark, and uttering, at short intervals, its low, lisping notes.

FAMILY **PARIDÆ**. NUTHATCHES AND TITS.SUBFAMILY **SITTINÆ**. NUTHATCHES.GENUS **SITTA** LINNÆUS.

[B 277, R 51, C 57, U 727.]

*Sitta carolinensis* Lath. White-breasted Nut-hatch. Resident; common. During the winter it is usually to be seen in company with the chickadees. On the 15th of April, 1880, a set of five eggs of this species was taken from a cavity thirty feet from the ground, in a large white oak. The nest was visited quite frequently for the next two or three weeks—until fifteen eggs had been taken. The bird was captured on the nest on three different occasions, and after being handled carefully for a few minutes, set at liberty.

[B 279, R 52, C 59, U 728.]

*Sitta canadensis* Linn. Red-breasted Nuthatch. Migratory; rare.

## SUBFAMILY PARINÆ. TITMICE.

GENUS *PARUS* LINNÆUS.SUBGENUS *LOPHOPHANES* KAUP.

[B 285, R 36, C 40, U 731.]

*Parus bicolor* Linn. Tufted Titmouse. Northern Iowa, rare; central Iowa, not common; southern Iowa, "abundant; resident throughout the year." (Trippe).

SUBGENUS *PARUS* LINNÆUS.

[B 290, R 41, C 44, U 735.]

*Parus atricapillus* Linn. Chickadee. Resident; abundant. Nests in cavities in stumps. Eggs, six to ten in number, but usually seven; they are laid during the last week in April, or first in May. Not infrequently the nest is found at a height of ten or twelve feet from the ground. During the cold months the chickadee is to be seen almost every day—even in towns—but as spring approaches it retires to the woods to breed, and is not often noticed unless especially sought for in its favorite haunts. About the middle of September it again comes out of the secluded woodland where it has passed the summer.

## FAMILY SYLVIIDÆ. WARBLERS, KINGLETS, GNATCATCHERS.

## SUBFAMILY REGULINÆ. KINGLETS.

GENUS *REGULUS* CUVIER.[B 162, *part*, R 33, C 34, U 748.]

*Regulus satrapa* Licht. Golden-crowned Kinglet. Common spring and fall migrant. In the spring arrives a few days earlier than *R. calendula*, and in the fall remains later. During the vernal migration it appears to prefer the tops of forest trees, while its congener is usually found in the small trees and bushes. In the fall it is found among the low willows along the streams.

[B 161, R 30, C 33, U 749.]

*Regulus calendula* (Linn.). Ruby-crowned Kinglet. Spring and fall migrant; abundant; arriving about the 10th of April, and sojourning three or four weeks.

## SUBFAMILY POLIOPTILINÆ. GNATCATCHERS.

GENUS *POLIOPTILA* SCLATER.

[B 282, R 27, C 36, U 751.]

*Poliophtila carulea* (Linn.). Blue-gray Gnatcatcher. Summer resident; rather common. Arrives the middle of April, and remains until the last of September. The nest is usually placed on a horizontal branch of an oak in the dense woodland. It is similar to that of the humming-bird, but slightly larger.

FAMILY **TURDIDÆ**. THRUSHES, SOLITAIRES, STONECHATS, BLUEBIRDS, ETC.SUBFAMILY **TURDINÆ**. THRUSHES.GENUS **TURDUS** LINNÆUS.SUBGENUS **HYLOCICHLA** BAIRD.

[B 148, R 1, C 6, U 755.]

*Turdus mustelinus* Gmel. Wood Thrush. Abundant summer resident. Appears about the first of May, and remains until September. It frequents the cool, shady woodlands in the vicinity of streams, where it commences to breed two or three weeks after its arrival. The nest of this species seems to be the favorite of the cow-bird (*Molothrus ater*), as a repository for its eggs. So frequently is this the case, that one may collect for a whole season, and not find more than half a dozen sets of wood thrushes' eggs without these parasitic eggs—all the others having from one to four eggs of *M. ater* in addition to those of the thrush. Several instances have been noted in which the wood thrush was sitting on the eggs of the cow-bird, with none of its own; while, on the other hand, one nest contained four eggs of each species—eight in all.

[B 151, R 2, C 7, U 756.]

*Turdus fuscescens* Steph. Wilson's Thrush. Migrant, and summer resident. Several nests have been taken at Des Moines, which are thought to belong to this species.

[B 154, R 3, C 12, U 757.]

*Turdus alicie* Baird. Gray-cheeked Thrush. Migratory; common. Arrives the first week in May, and remains about three weeks. Usually found in company with the next, in woodland.

[B 153, R 4 a, C 13, U 758 a.]

*Turdus ustulatus swainsonii* (Cab.). Olive-backed Thrush. Migratory; abundant; sojourning two or three weeks on both the spring and fall migrations. It prefers the low, damp woodland bordering the streams, but is often seen in favorable localities along the bluffs, at a distance from the water-courses.

[B 149, R 5 b, C 10, U 759 b.]

*Turdus aonalaschke pallasii* (Cab.). Hermit Thrush. Migratory; rather common; arriving about the middle of April. It is generally seen in the woodland along the streams.

GENUS **MERULA** LEACH.

[B 155, part, R 7, C 1, U 761.]

*Merula migratoria* (Linn.). Robin. Summer resident; abundant. Our most familiar species, and one of the earliest harbingers of spring,

often appearing in February and remaining until November. Commences nesting about the middle of April. During the season of 1880, an unusually large set of six eggs was taken in north Des Moines. Its nest is often very firmly and compactly built, as is well illustrated by a nest examined several years ago. It was several hours after a rather severe rain storm, and the nest was still over half full of water, nearly submerging the three eggs it contained. Among the many curious phenomena of avian life, it is believed the following incident is somewhat novel: One morning during the spring of 1879, a great commotion was noticed among the birds a short distance from the house. On going out into the yard, the cause of their uneasiness was soon learned. A robin was suspended by means of a narrow strip of calico from a small branch, some fifteen feet from the ground. Further examination showed that the bird was dead, and that a foot or more of the calico (which was about three feet in length), had been swallowed by the unfortunate robin, and the other end of the strip had caught on the branch, leaving the bird suspended fifteen or twenty inches below.

GENUS *SIALIA* SWAINSON

[B 158, R 22, C 27, U 766.]

*Sialia sialis* (Linn.). Bluebird. Abundant. One of the first of our summer residents to put in an appearance in the spring—sometimes even preceding the robin. Nesting frequently begins early in April; and two or three broods are raised in a season. May 22, 1882, nest was found in a small cavity in a hawthorn tree; it contained four eggs of the bluebird, and one of the house wren (*Troglodytes aedon*). Occasionally the bluebird builds its nest in the excavations made by bank swallows in the sides of gravel pits.

[B 159, R 23, C 28, U 767.]

*Sialia mexicana* Swains. Western Bluebird. Occasionally taken in western Iowa. Also recorded as having been taken in the State by Mr. Atkinson.

## THE NORTH-AMERICAN GENUS, CEANOOTHUS,

With an Enumerated List, and Notes and Descriptions of Several Pacific Coast Species.

BY C. C. PARRY.

• (Read before the Academy, December 28, 1888.)

SINCE the important additions to the exclusively North American genus, *Ceanothus*, L. made by the discoveries of Mr. Nuttall, on the Pacific coast, over fifty years ago (1836), and published in Vol. I., Flora of North America, nearly all the systematic work undertaken in defining species and arranging them in natural groups, has been mainly based on the fragmentary specimens accumulated in the large *herbaria*, remote from the region where they reach the fullest development.

The latest revision (not yet completed), by Professor Trelease, of the Shaw School of Botany, at St. Louis, Missouri, and published in the Proceedings of the California Academy of Sciences, Vol. I., 2d Series, pp. 110-118, enumerates thirty-two species, all but six of which belong to the Pacific coast district. This interesting synoptical list, embodying the latest results of herbarium study, and bringing together, in compact form, the scattered literature of this genus, shows, no less plainly, the lack of personal field observations, which would have helped to solve many of the dubious points here brought to view, the difficulties of which none can so well appreciate as the author himself.

With the present writer, whose field observations on the Pacific coast now cover a period of forty years, a growing interest has been felt, as renewed opportunities have offered for investigating, in their native haunts, the varied forms of this attractive genus; and, during the past decade, special attention has been given, by copious collections and field notes, to elucidate this subject in its strict botanical relations, some of the results of which are hereby presented, for the first time:

### GENERAL OBSERVATIONS.

As a natural genus of plants, since its separation from the allied *Rhamnaceous* genera with which it was combined by Linnæus, it pre-

sents unusually well-defined and characteristic features. Thus whether seen in the wide-spread, typical species, *C. Americanus*, the minute-leaved *C. microphyllus* of the Southern Atlantic coast, the densely-branched, spine-clad *Ceanothi* of Mexico, or the more luxuriant forms of the Pacific coast, it presents the same assemblage of characters, in habit of growth, foliage, inflorescence, and fruit, to some of which points it may be well briefly to allude.

As a shrub, it, of course, fits in well with allied *Rhamnaceous* genera, in its densely-branched ramification; its tendency, especially in arid districts, to defend itself from aggression by terminating its interlocking branches with rigid spines, of which the botanical explorer is apt to carry away lasting mementoes. Its leaf venation is of such a marked character as to afford the fossil botanist some of the most reliable *data* for connecting the present vegetation with that of remote geological epochs.

The inflorescence, composed of a thyrsoid aggregation of irregular, fascicled umbels, is often prolonged in graceful plumes, either a pure or dull white, or various shades of blue, (never, as sometimes stated, yellow). The separate flowers, with their slender, colored pedicels, show inflexed calyx lobes, from the clefts of which spread out the hooded petals, which, at the proper season relax, to release the enclosed stamens, overtopping the trifold style. The massed flowers, though strictly speaking, hermaphrodite, are inclined to be polygamous, most of them, after the period of fertilization becoming effete, though a favored few develop fruit. Hybridity, which would seem to be largely favored by the profusion of showy and occasionally fragrant flowers, and which has been supposed to be largely instrumental in confusing species, is not a very troublesome feature in field observation, where alone it can be properly studied. By far the majority of species having a distinct geographical range and different periods of flowering, while even such as grow in close proximity and flower at the same time, each maintain their proper specific characters; while true hybrids, however puzzling in the herbarium, are, in their proper field of growth, readily traced to their ancestral sources.

The fruit, which so strongly simulates in external appearance some of the *Euphorbiaceous* genera as to have suggested a near relationship—though not carried out in other points—varies considerably in its size, its smooth or resinously-coated exocarp and its accessory appendages, but has otherwise very uniform characters of seed and pericarp. A fact not often noticed, but which is probably more or less true of all species, is that the rigid *Cocci*, when released from their attachment to

the indurated disc, expel their smooth-coated seeds through the ventral slit with considerable force. I have had occasion lately to notice this, even in herbarium specimens of nearly mature fruit, which when brought into a warm apartment, revealed their explosive nature by a continuous fusilade, till the ammunition was all expended and the fragments of the ruptured pericarp alone left to determine their carpological features. The manifest utility of this provision for disseminating seeds, will largely account for the gregarious habit of most of the species, and, no doubt, also serves as a protection against the aggression of omnivorous rodents, to say nothing of avaricious botanists.

There is still another feature of growth calling for some detailed notice. Contrary to the view presented by Professor Trelease in the paper above referred to, it is quite certain that nearly all the Pacific coast species develop their inflorescence from buds fully formed the previous season, and rarely from the shoots of the same year. As collecting botanists do not often gather belated specimens which would show the late-formed buds, it is quite likely that ordinary herbarium specimens do not clearly show the true conditions of future growth, and hence such a mistaken conclusion might be easily reached; but, as far as my observations go, it is only the well-known Eastern Atlantic species, together with the Mexican, *C. azureus*, and probably *C. decumbens* of the Sierra Nevada, that flower from the fresh-growing shoots of the same season.

The usual character of growth and inflorescence, as seen on the Pacific slope, may be here briefly stated: When seen in the season of late autumnal rest, and before the winter rains set in, or where, in the higher mountains the deep winter snows come on to protect the tender growth, the later leafy shoots show in their axils or terminal branches, a more or less distinct development of flower buds, closely enwrapped in protecting scales, the latter usually densely tomentose; as soon as growth commences, which in the lowlands, is often as early as January or February, and extending northward as late as May or June, the deciduous scales, each subtending a fasciculate cluster of pedicels, are pushed off, and the flower buds, often showing a lower series of leaf bracts, expand their flower clusters, which gradually elongate to their full development. In maturing fruit, the whole flowering branch, including the lower empty leaf bracts, lose their vitality and remain, after the expulsion of the seeds, as dead withered branches, surmounted by the remains of the indurated and brittle disc and calyx tube. It was probably on such a specimen of *C. sanguineus*, that Professor Trelease based his conclusion that it was the only species to develop flowers

from the old wood. It is only when the fruiting process is well advanced, that the summer shoots set to work to prepare flower buds for the next season, occasionally however, tempted by an early autumnal rain or favorable conditions of growth, to push out premature flower buds, which, in their starved aspect, show that they are out of season, associated as they are, with fully developed fruit of the same year.

CHARACTERS ON WHICH SPECIES AND GROUPS CAN BE MOST  
SATISFACTORILY DEFINED.

Before proceeding to an enumeration of the species here recognized in the accompanying synoptical list, it seems proper to dwell briefly on some of the most reliable characters, especially such as are brought to view in field observations, which afford the best means for defining species and arranging them in natural groups. And first, the ramification of *Ceanothus* offers some distinctive features. Thus, while the thrifty-growing species, such as *C. thyrsiflorus*, *C. arboreus*, *C. integrifolius*, and several others exhibit the usual prolonged growth and flexible branches, usually more or less angular when young, and destitute of spines; others, subjected to more arid conditions of soil and climate, show a disposition to branch at right angles to the main axis, which branches, failing to secure sufficient nourishment for prolonged growth, terminate abruptly in stiff spines, which, interlocking, form the thickets popularly known as *chaparral*. These contrasted characters, while clearly noticeable in certain groups, are not always sufficiently constant to define their limits.

Again, an important character, not always apparent in herbarium specimens, is the relative persistence of the foliage; thus, there are included in this genus, species with annually deciduous leaves, showing naked winter branches, while others are strictly evergreen, retaining their leaves indefinitely—while there is still a larger intermediate class, including most of the Pacific coast species, in which the leaves persist for at least two seasons, and never show purely naked stems on the upper branches. It is quite possible that these characters would accurately define three very distinct natural divisions, as will be partly indicated in the succeeding list.

Still farther the venation and pubescence of the leaves offers good distinguishing marks, and these being equally available to the closet and field botanist, have been largely relied on by the former to limit groups, and may, no doubt, be used to advantage, when properly combined and qualified by other constant characters, so that species otherwise widely diverse, may not be brought together in unnatural, artificial

groups. The characters of entire, serrate, or glandular leaves, seems to be more variable as a specific character, than is usually met with in other genera, but occasional exceptions to uniformity in this respect only emphasizes the importance of combining several characters in a complete description, so that if one fails, the others may hold good.

The leaf stipules furnish some well-marked characters; thus, while usually thin and fugaceous in the *Eu-ceanothus* section, in the group with annually deciduous leaves, they often persist till after the fall of the leaf, as may be frequently seen in older branches of *C. Americanus* and *C. azureus*. In the *Cerastes* section, they usually show a thickened, corky, persistent base, often remaining as verrucose excrescences, while the slender tips are early deciduous.

The inflorescence, while quite uniform in its general features, as composed of an irregular series of umbellate clusters, offers good specific characters in its more or less compact or prolonged thyrsoid development. The separate flowers offer no important distinctive characters, being remarkably uniform throughout, while the color, though usually constant in the same species, is occasionally variable.

The fruit offers some important distinctions in the shape and size of the *Cocci*, the smooth, fleshy, or resinous exocarp, and the presence or absence of crests or accessory appendages.

#### GEOGRAPHICAL RANGE.

The geographical distribution of the different species of this genus is usually well-defined, and holds very obvious relations to the variations of soil and climate. This is true not only of such as have the extended range of *C. Americanus*, but also applies to such as are limited to a comparatively small area. Wherever met with, they are inclined to be gregarious, due, as I have above suggested, to the character of expulsive capsules, by which the seed is self-sown in its own locality. The smooth, polished seeds, with their comparatively large cotyledons and a liberal supply of albumen, seem thus calculated not only to maintain their vitality under adverse conditions, but also to afford a vigorous growth under favorable circumstances. It is, no doubt, owing to these characters, that the Pacific coast of California constitutes the most suitable home for this genus, and in its varied aspects of soil and climate, invites to the largest display of specific forms. It thus happens that there is no considerable expanse of country in this region, especially on the foot-hills or the mountain slopes, that is without its exhibit of one or more of these characteristic shrubs. If asked to designate a spot where they occur in the greatest profusion and variety,

I should not hesitate to award the palm to the Santa Cruz range of mountains, where, in a few hours' climb, are brought to view such charming groups as *C. incanus*, *C. papillosus*, *C. Andersoni*, and *C. thyrsiflorus*, with its occasional hybrids, vying with each other in displaying the most refined tints of white or blue, or expanding into the clear atmosphere of early spring their delicate feathered plumes.

In the *Cerastes* section—almost peculiar to California—with their rigidly coriaceous, usually opposite leaves, there is still more tendency to aggregate in massed growths, but in such cases the thickets are mainly composed of single separate species, and, therefore, less subject to hybridization.

The confusion of specific forms, due to hybridization, admits of an easy solution in the field, where, by extended observation, each separate species can be studied in its undisturbed condition. Thus, if Mr. Howell, the active and intelligent botanical collector of Oregon and Washington Territory, would extend his observations only by a few hours' travel, as far as the central range of the Sierras, and the Sacramento Valley, he would not venture his opinion that he "is disposed to regard *C. prostratus* as only a variety of *C. cuneatus*."

In the accompanying list I have briefly indicated, by locality, the geographical range of such species as have come under my personal observation, but the *data* are yet wanting for determining accurately the range of all the species here represented.

In submitting a synoptical arrangement of the thirty-three species herewith enumerated, I have endeavored to bring them into simple, natural groups, without any attempt at elaborate classification, such, in fact, as they appear from the standpoint of a field observer. If varying in this respect from that of more studied efforts, I can only say, I write as I have seen. To the separate species in the numbered list, I have only added notes of such as are imperfectly known or needing correction, with fuller descriptions of several new species; referring to the well-known systematic writers on this genus, for the synonymy and literature of the same.

#### CEANOTHUS, L.

##### SYNOPTICAL LIST OF SPECIES.

A. § EU-CEANOTHUS. Branches flexible or rigidly spinose; leaves alternate, deciduous, or persistent for two years or more, pliable or sub-rigidly coriaceous, entire, crenately serrate or glandular-ciliate, triple-nerved from the base, or penni-nerved; stipules slender membranaceous, usually fugaceous; inflorescence axillary or terminal, compact or loosely

thyrsoid, proceeding from shoots of the same year, or from buds fully formed the previous season, the elongated peduncles more or less leafy bracted below; fruit smooth, or triangular carinate, exocarp frequently resinous. VI. groups—25 species.

#### GROUP I. AMERICANUS.

Leaves renewed annually, broadly cordate to ovate, triple-nerved from the base, reticulately veined, pubescent to densely tomentose beneath, serrate; inflorescence mostly from the same season's growth—except No. 3.

1. *C. Americanus*, L. } Eastern Atlantic slope, extending to the
2. *C. ovatus*, Desf. } Rocky Mountains.
3. *C. sanguineus*, Pursh. North Pacific coast.
4. *C. decumbens*, Watson. Sierra Nevada of California.
5. *C. azureus*, Desf. Mexico.

#### GROUP II. INCANUS.

Branches usually spinose; leaves ovate to orbicular, entire, or glandularly serrate, canescently pubescent, triple-nerved, with inconspicuous mid-veins.

6. *C. incanus*, Torr. & Gray. Santa Cruz Mountains.
7. *C. cordulatus*, Kellogg. Sierra Nevada.
8. *C. divaricatus*, Nutt. Southern California, including variety *eglandulosus*, Torr., which is the common form.
9. *C. intricatus*, n. sp. Densely branched, younger shoots hirsutely pubescent; leaves somewhat rigid, crowded on short stems, short petiolate, narrowly ovate (15 x 6 mm.), dull green above, hoary pubescent beneath, triple-nerved from the base, with inconspicuous mid-veins, more or less strongly revolute, margins entire, but glandularly ciliate; inflorescence short pedunculate, not exceeding the leaves—flowers not seen—fruit 4 mm. broad, smooth, with resinous exocarp, cocci with blunt apical crests.

*Habitat*.—Known only from fruiting specimens collected on the summit of Mount Tamalpais, Marin County, July, 1886, by Mrs. M. K. Curran; closely allied to *C. cordulatus*, but differing in the character of its foliage, and peculiar in its isolated locality.

10. *C. Fendleri*, Gray. Rocky Mountains of Colorado and New Mexico, to Arizona.
11. *C. depressus*, Benth. Central Mexico.

## GROUP III. SOREDIATUS.

Branches not spinose; leaves strongly triple-nerved, glandularly crenate, usually densely tomentose beneath; flowers blue or white.

12. *C. sorediatus*, Hook. & Arn. Foot-hills of the Sacramento Valley. I am inclined to confine this species to the slender supple-branched and sparse leaved shrub of the district above designated. The leaves variable in size, 10–15 mm. in length, broadly ovate to subcordate, densely white tomentose beneath, irregularly glandular-crenate, short petiolate; stipules thicker than usual in this section; the inflorescence on the terminal branches is of a more intense azure blue than any species known to me. This is unquestionably the species described by Dr. Kellogg, Proceedings California Academy of Sciences, I., p. 55, as *C. azureus*. What has been generally referred to this species from Southern California, is an arborescent form of *C. hirsutus*, or possibly an undescribed species.

13. *C. arboreus*, Greene, Bull. Cal. Acad., II., p. 144. Only known on the islands off the Southern California coast.

14. *C. velutinus*, Dougl. Widely spread to the north and east of the Sierra Nevada.

15. *C. hirsutus*, Nutt. Coast ranges of Santa Barbara and southward. This species needs a more careful field study than it has yet received to verify Nuttall's original description—Fl. N. Am., I., p. 266—till which time much doubt will attach to the various forms included in herbaria from widely remote localities. As seen in the southern coast range, what has been recognized as *C. hirsutus* is a tall shrub, with tree-like trunk, and slender, minutely verrucose branches, not conspicuously hirsute; the leaves very finely glandular serrate, deep green above, pale and closely pubescent beneath; inflorescence terminating in short, leafy shoots, oval, compact, of a dull purplish blue; fruit 4 mm. broad, distinctly three lobed, smooth and bluntly crested. *C. oliganthus*, Nutt., which has been referred to this species, should, from the fruit character, be distinct, and the specimens from the Upper Sacramento and East Humboldt Mountains must undoubtedly belong to a very different and probably undescribed species.

## GROUP IV. THYRSIFLORUS.

Young branches angular; leaves oblong, conspicuously veined, either triple-nerved or penninerved, usually tomentose beneath, more or less revolute, glandular-serrate, or papillose glandular on the surface; in-

florescence long pedunculate, diffusely thyrsoid, or compactly globose; inclined to hybridize with other species of this group.

*Leaves triple-nerved.*

16. *C. thyrsiflorus*, Esch. Central California, near the coast, with three well-marked hybrid forms, viz.:

- a. *C. thyrsiflorus* × ——— (?) = *C. Lobbianus*, Hook.
- b. *C. thyrsiflorus* × ——— (?) = *C. Veatchianus*, Hook.
- c. *C. thyrsiflorus* × *C. papillosus*.

Of this last only, have I sufficiently definite information to refer the specimens collected to the two parent forms. These showing their ordinary specific characters unchanged, were growing luxuriantly along the sides of a wild mountain road, the low-branched *C. papillosus* being often overtopped by its more aspiring rival, *C. thyrsiflorus*. The season of flowering being the same in both, they were equally attractive to swarming insects, the natural result being noticed in occasional dwarf bushes partaking of a mixed character; thus, while the leaves conspicuously veined beneath, show a tendency to triple nerves, these do not extend to the base of the leaf, and towards the apex take on the penninerved character of *C. papillosus*, but without papillæ on the upper surface. The inflorescence is after the compact pattern of *C. papillosus*, and the fruit, which occasionally perfects its seed, is also nearest to the latter species. From this instructive example I have little hesitation in reducing the forms *a.* and *b.* to a similar origin, and thus relieve systematic botany from the burden of carrying doubtful species, though it will require direct field observation to assign them to their double parentage.

*Leaves penninerved.*

17. *C. Parryi*, Trelease, l. c. I have little to add to the well-characterized description of Professor Trelease, except to state that it has been observed and abundantly collected the past season (1888), on mountain slopes near Calistoga, where it is associated with *C. foliosus*. It has also been detected from other remote localities, in early botanical collections, so that it is probably of rather extended geographical range. Unquestionably its nearest relations are with *C. papillosus*, the chief points of difference being the absence of papillæ, and a more diffuse inflorescence.

18. *C. papillosus*, Torr. & Gray. To include variety *dentatus* = *C. dentatus*, Torr. & Gray, and variety *floribundus* = *C. floribundus*, Hook.

After extended observation and careful study of *C. papillosus*, where it exhibits its fullest development, in the Santa Cruz Mountains, I am forced to the conclusion that it properly includes the two forms above noted, heretofore regarded as distinct species. When seen in its most luxuriant state on the lower slopes of the Santa Cruz range, it is a densely-branched shrub, 4-6 feet in height, with large oblong leaves (50 x 10 mm.), corrugated on the upper surface, and abundantly garnished with projecting papillæ, tomentose below, and only slightly revolute on the margin. Farther up, the leaves become reduced fully one-eighth the size of the lowland form, and are strongly revolute, almost to the midrib; in this state, the clustered and long pedunculate inflorescence of a deep blue is attractively conspicuous, suggesting at once the published figure of *C. floribundus*, Hook., Bot. Mag., pl. 4,806, but still farther, it also forces the conclusion that *C. dentatus*, Torr. & Gray, is only a form of this species, destitute of papillæ. Before coming to this conclusion, I was led to investigate the true nature of these papillæ, and find that they are only the usual form of glands so commonly met with on the edges of the leaf, where they can most readily break through, while on the upper surface the thicker epidermis usually covers them as protuberances, though not unfrequently revealing their true nature by pushing through, as regular glands. It thus appears that, though a conspicuous character, it is not necessarily constant, or of specific value. As in my view, it is only the absence of the papillæ that separates *C. dentatus* from the reduced forms of *C. papillosus*. I have re-examined an authentic *C. dentatus*, corresponding precisely to the figure in Bot. Mex. Bdy., pl. 10, and find that while surface papillæ are not to be seen, yet the projecting glands at the margins of the leaf are not directly on the edge, but on the revolute folds of the upper surface, so that the essential point of difference is narrowed down to a very small margin. Besides, it is not unlikely that the older herbarium specimens in which *C. dentatus* is generally represented, may have lost the traces of surface glands by age and pressure, a fact which I have been able partly to verify in an examination of old herbarium specimens of *C. papillosus*. On these grounds I feel justified in relieving botanical observers from the care of a vain search for these doubtful forms.

19. *C. impressus*, Trelease, l. c. Coast range, north of Santa Barbara. Known only from imperfect material.

#### GROUP V. INTEGERRIMUS.

Branches flexible, or spinose in No. 22; leaves oblong or broadly lanceolate, usually smooth, and inconspicuously veined, entire; inflorescence thyrsoid, on leafy peduncles.

20. *C. integerrimus*, Hook. & Am., including variety *parvifolius*, Watson; *C. parvifolius*, Trelease, l. c.; *C. Palmeri*, Trelease, l. c.

From an extended observation of the various forms of this species, through the entire length of California, occupying not only the upper valleys but the higher mountain slopes, I am led to the conclusion that they properly belong to one species, of which it would be possible to make many varieties. The size of the leaf is, of course, unimportant, being easily explained by climatic differences; the leaf venation is also seen to vary from distinctly triple-nerved to obscurely penninerved, while the flower, most commonly white, takes on every shade of faded or bright blue. The most reliable characters are in the texture of the leaf, flexible and inconspicuously veined, the copious and diffuse thyrsus of flowers, on prolonged leafy peduncles, and the fruit, 5–7 mm. broad, and bluntly keeled.

From a photograph of the typical *C. Palmeri*, Trelease, kindly furnished by the author, I have no hesitation in including it as a southern form of this rather polymorphous species.

21. *C. Andersoni*, n. sp. Smooth throughout; branches light green, glaucescent, younger shoots angular; leaves deep green above, entire, oblong-ovate to oblanceolate, cuneate at base to a slender petiole, obscurely penninerved, and paler beneath; inflorescence diffusely thyrsoid, prolonged, leafy below, flowers white, with very slender pedicels; fruit smooth, with thin, resinous exocarp, and rounded cocci.

*Habitat*:—A tall shrub, 10–15 feet high, loosely branched above, somewhat pendent, the prolonged inflorescence delicate snow-white, flowers in May, fruit July. Santa Cruz Mountains, near Ben Lomond; first collected by Dr. C. L. Anderson, 1887, whose name heretofore so intimately connected with the botany of Santa Cruz, both on sea and land, this attractive species properly commemorates.

22. *C. spinosus*, Nutt. Coast range Santa Barbara, and southward.

#### GROUP VI. MICROPHYLLUS.

Leaves minute, rather rigid, smooth above, pubescent beneath, irregularly crenate-serrate, fasciculate in the axils, or developing into slender leafy branches; inflorescence terminal or axillary, in small fasciculate umbels.

- |                                      |                         |
|--------------------------------------|-------------------------|
| 23. <i>C. microphyllus</i> , Michx.  | } South Atlantic coast. |
| 24. <i>C. serpyllifolius</i> , Nutt. |                         |
| 25. <i>C. foliosus</i> , n. sp.      |                         |
- Branches slender, divergent, pubescent when

young; leaves somewhat coriaceous, crowded, fasciculate, small—5 to 8 mm. long—ovate, obtuse, narrowed at base to a short petiole, irregularly crenate, with frequent resinous glands, obscurely triple-nerved near the base, not revolute at the margin, but inclined to fold back on the midrib; inflorescence terminal and axillary, loosely globose, or slightly elongated; flowers few, on short pedicels, light blue; fruit triangular, 3–4 mm. broad, sharply crested at the summit.

*Habitat*.—A densely-branched shrub, 3 to 5 feet high, with light green leaves, more or less resinous glandular; has been referred to *C. dentatus*—included above as a variety of *C. papillosus*—from which it differs in every essential character. In its general features, it comes nearest to the South Atlantic coast species, forming, with them, a well-marked group, approximating the Section following. The specimens seen were collected in the upper Napa Valley, where it is abundant, being associated with *C. Parryi* and *C. divergens*.

B. § CERASTES. Leaves opposite or alternate, persistent for several seasons, rigid coriaceous, entire or spinosely toothed, not glandular, smooth above, with a circular areolate pubescence beneath between the veins; stipules thick, corky at base, with deciduous tips; inflorescence short, fasciculate umbellate, from buds fully formed the previous season; fruit conspicuously crested, with accessory appendages.

#### GROUP VII. RIGIDUS.

Character same as Section. Eight species.

##### *Opposite leaves.*

26. *C. rigidus*, Nutt. Monterey, and coast ranges of Central and Southern California.

27. *C. crassifolius*, Torr. Widely spread through the mountain districts of Southern California. Foliage somewhat variable, but general habit quite constant.

28. *C. prostratus*, Benth. Elevated pine ridges of the northern Sierra Nevada.

29. *C. divergens*, n. sp. Branches rigid, divergent, hoary pubescent when young; leaves 10–20 mm. long, 5–10 mm. broad, very rigid coriaceous, cuneate at base to a very short petiole, broadly truncate at summit, with prominent midrib, the principal pinnate veins terminating in sharply mucronate broad serratures, dull green above, with distinct rows of tufted areolar pubescence beneath; inflorescence in short um-

bellate peduncles, occasionally subtended by one or more leaflets; fruit oblong, 5 mm. broad, 8 mm. long, deeply immersed in the rigid disc; exocarp spongy, light pink before maturity, the appendages at the summit of the cocci conspicuously horned, with accessory intermediate crests.

*Habitat*.—A low-branching shrub, the long divergent branches inclined to support themselves on adjoining bushes, but never decumbent. Flowers in April, fruit July; only known from a single locality in the interesting botanical district of the Napa Valley. Though closely allied to *C. prostratus*, with which, in herbarium specimens, it is easily confounded, it is clearly distinct in habit and foliage, as well as a widely different geographical range. Like all the species of this Section, the explosive character of the capsules is very apparent to any one who would undertake to collect fully mature seeds.

30. *C. cuneatus*, Nutt. Ranging through the entire length of California.

31. *C. Greggii*, Gray. Mexico.

*Leaves alternate.*

32. *C. megacarpus*, Nutt. Coast range of Santa Barbara.

33. *C. verrucosus*, Nutt. Table-land on the coast of San Diego, into Lower California.

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## CHORIZANTHE, R. Br.

Review of Certain Species Heretofore Improperly Characterized, or  
Wrongly Referred; With Two New Species.

BY C. C. PARRY.

(Presented to the Academy, January 25, 1889.)

SINCE the revision of *Chorizanthe*, in Proceedings of Davenport Academy of Sciences, Vol. IV., pp. 45-63, an opportunity for examining typical specimens, as well as extended observations and collections in the original localities requires the following changes in the descriptions there given, viz:

13. *C. Douglasii*, Benth. Trans. Linn. Soc. Vol. XVII., p. 418—*C. Douglasii*, Parry, l. c., ex. character — *C. pungens*, var. *diffusa*, Parry, l. c., in part:

Four to eight inches high, branching and assurgent from the base, or erect and simple for the first joint, dichotomous spreading above, hoary pubescent throughout; radical leaves oblong-spathulate, gradually tapering below to a narrow winged petiole, upper leaves short petiolate, passing above to sessile apiculate leaf bracts; inflorescence in small terminal clusters, with crowded acicular bracts; involucre oblong campanulate, slightly contracted near the throat, sharply angled, transversely corrugated between the ribs, teeth divergent, shorter than the tube, membranous margined to near the uncinat tips, usually light pink; perianth short pedicellate, lobes slightly unequal, erosely denticulate and apiculate, one-third as long as the tube; stamens nine, anthers oblong; akens narrowly-winged, embryo, with narrow cotyledons and short radicle.

*Habitat*:—Abundant in the valleys of the Santa Cruz Mountains, near Felton and Ben Lomond, in sandy soil, usually low-spreading. Is easily recognized by the purplish acicular bracts, and the lighter pink membranous margins of the involucre.

What has been in the paper above referred to, designated as *C. Douglasii*, is hereafter described as *C. robusta*, n. sp.

Variety *albens*. Low-branching, 3–6 inches high, of a hoary gray color, the inflorescence albescent, and the expansion of the involucre conspicuously white; not otherwise distinguishable from the typical *C. Douglasii*. Grows in extensive patches in the Salinas Valley, flowering in May.

#### TWO NEW SPECIES.

##### 21<sup>1</sup>. *Chorizanthe Andersoni*:

Two to eight inches high, densely-branched from the base, spreading, hairy pubescent, joints slender, fragile; leaves mostly radical, oblanceolate, tapering below to a margined petiole, occasional leaf bracts on the lower joints, upper bracts acicular; inflorescence rather loosely cymose; involucre sharply-ribbed, intervals somewhat corrugated, longer segments equal to the tube, alternate one-half shorter, all membranous winged at base, and with uncinat teeth; perianth short pedicellate, narrowly obconic, lobes spathulate, one-fourth as long as the tube, equal, entire, or short apiculate; stamens nine, on slender filaments, anthers short; akene and embryo similar to allied species.

*Habitat*:—Scott's Valley, near Santa Cruz, Dr. C. L. Anderson, 1887. Ben Lomond, Santa Cruz Mountains, July, 1888, growing in deep, sandy soil. Differs from *C. pungens* in its slender-branching habit, its usually naked upper joints, and smaller inflorescence. This very distinct species probably includes *C. pungens*, var. *nivea*, Curran, briefly noted in Bull. Cal. Acad. Sci., IV., pp. 3-4.

13<sup>2</sup>. *C. robusta*—*C. Douglasii*, Parry, l. c., not Benth. — Character transferred, ex-*Habitat*:

"Stout, 2-18 inches high, light green, densely pubescent, simple or irregularly-branched above, with one or more foliaceous whorls on the main stem and lower axils; radical leaves, ob-lanceolate, tapering to a narrow petiole; upper involucre bracts acicular, densely ciliate; involucre oblong-triangular, 2-3 lines long, segments unequal, slightly divergent with scarious margins, and short, recurved uncinat teeth; perianth short pedicellate, exsert, lobes nearly equal, shortly mucronate, and erosely denticulate; stamens nine, adnate to the lower tube, anthers oval; style akene and embryo as in allied species."

*Habitat*:—Dry, sandy soil, margins of Monterey Bay, north of Aptos, Parry, 1883. Sandy banks and streets of Alameda, adjoining the bay, E. L. Green, 1887. Distributed in *Chorizanthe* sets by C. C. Parry, as No. 13, *C. Douglasii*, Benth.

It was not till an opportunity offered of seeing typical *C. Douglasii* in the Gray Herbarium at Cambridge, and the original Douglasian specimens at the herbarium of the Royal Gardens, Kew, England, that I was made aware of my mistake in referring this very distinct species to *C. Douglasii*. Since then I have seen and collected abundantly the genuine plant, in the mountain valleys back of Santa Cruz, undoubtedly the original locality. Owing to the close resemblance in habit and general aspect which the above described species has to *C. valida*, Watson, I was inclined to regard it as a marked variety of the latter, but the floral characters are so distinct that I am obliged to regard the former as an undescribed and well-defined species, to follow *C. Douglasii* as No. 13<sup>2</sup> in the synoptical list.

Memorial of  
**David Sylvester Sheldon.**  
1809—1886.



**PROFESSOR DAVID S. SHELDON, LL.D.**

BY C. C. PARRY.

*(Read before the Davenport Academy of Sciences, at the  
Memorial Meeting, June 11, 1886.)*

HAVING been requested to prepare, for this occasion, a somewhat systematic account of the life and scientific labors of our late associate, Prof. D. S. Sheldon, with special reference to his connection with this Academy, of which he was one of the founders, and its first President, I have endeavored to comply, as far as my limited information goes, premising that this is necessarily an imperfect sketch of a noble character, such as could only be faithfully portrayed by an intimate personal friend, having access to private documents and authentic journals. Such as it is, I desire to lay it before you as at least, a sincere tribute to his memory, and a faint recognition of his sterling qualities as a man, and his endearing features as a friend.

In the early years of the present century (December 6, 1809), among the rugged hills of Vermont, David Sylvester Sheldon first saw the light—the son of a well-to-do farmer, which meant, in that day and place, more than it does in ours, a life of earnest toil and privation, developing faculties of self-reliance, and a sturdy physical frame. With such an inheritance, young Sheldon was also favored with an early scholastic training, such as was then in vogue in the New England Academy, well fitted to impart not only solid learning, but better still, mental development. So we find him, at sixteen years of age, a pupil at Castleton, Vermont, long distinguished, as now, for its wild, romantic scenery, and its elevated educational institutions. That with such surroundings he should have early imbibed a taste for natural science is easily conceivable, even amid the dry abstractions of classical learning and rigid mathematics, which then formed the chief curriculum of study.

So we find him progressing, becoming fitted for college at the age of nineteen, and graduating at Middlebury in his twenty-third year. As was usual in that day, he varied his duties, and, no doubt, economized his means, by teaching in adjoining country schools. And now comes

the important duty of selecting a profession. Quite naturally to a serious and thoughtful mind, the pulpit seemed to present the strongest claims, and accordingly, theological studies are pursued at that distinguished School of the Prophets, Andover. But before the definite step is taken that would have made him what he gained in another direction, a Reverend, the zeal for teaching took possession of his earnest faculties, and, taking up what was then regarded as a lower calling, he devoted his zeal and abilities to raising his chosen vocation to a higher level.

Fifty years ago, the writer, then a school-boy at Bennington, Vermont, had his first acquaintance with Mr. Sheldon, then Principal of the Bennington Academy — hardly a personal knowledge, however, for, unfortunately, I was not a scholar of his, but belonged to a rival school, in which one of the lessons taught was a mean contempt for other institutions. Still, it was apparent to all, that a master mind had the control of the rival academy, and there were certain progressive features there introduced that at least excited our envy, if not our approbation. The impression still remains with me, that for real, solid educational acquirements, the school under Mr. Sheldon was the best.

At that early day, one who has since become noted as a pulpit and platform orator, Rev. E. H. Chapin, was acting as deputy post-master in that village, and occasionally electrified us smaller boys by his dramatic rendition of *Lochiel*.

And so we parted for a while, only to meet again on the western banks of the Mississippi, almost the *ultima thule* of our early geographies.

Mr. Sheldon is next seen exchanging the green hills of Vermont for the wild chasms of the Saranac in North-Eastern New York, at Potsdam, geologically celebrated by its old red sandstone, one of the lowest of our stratified rocks. Still a teacher, and, no doubt, also a learner, at least the reputation there gained secured him an invitation to the sedate and classical town of Northampton, in the Connecticut Valley. Here, unhampered by jealous rivalry, he threw the whole force of his gifted mind and rich experience into a school distinguished by such scholars as Elizur Wright and others of less note, who continued to look up to Mr. Sheldon as the source of their earliest inspiration.

But, under this mental strain, even the stalwart form of our Vermonter gave way, and, at the age of thirty-nine, he was obliged to seek relaxation in travel; at first, to the south, and eventually to the far west, in Iowa. Coming to Burlington in 1850, then the most prominent

Iowa town, he commenced his pioneer educational work in the west. Here, the heavy hand of affliction was laid on him in the loss of an only child, and soon after, with his stricken life-companion, he came to Davenport, having accepted a professorship in Iowa College. Thus, at the age of forty-four, this place became his permanent home. Here, then, we begin to tread on familiar ground. The sturdy son of Vermont took kindly to the trying climate of Iowa, with its chilling winter blasts and summer heats, the peculiarities of which he made a special study, in connection with a complete set of meteorological instruments, records of which are, no doubt, still accessible. As Professor of Natural Science, one of the important duties devolving upon him was the establishment of a museum, and the times usually devoted to relaxation were largely spent by him in scouring the adjacent country, securing specimens of plants, shells, fossils, etc., which, by an extensive system of exchanges, secured valuable returns from all parts of the world. In connection with this was also accumulated a valuable scientific library.

During the summer vacations longer excursions were undertaken, and the boggy margins of Rock River, in Illinois, yielded up their hidden treasures of *Unio* shells, here in their richest development, but only to be procured by persistent wading and digging. In this way was secured the magnificent series of forms that excited the admiration of Prof. Agassiz, many of which went to enrich the museum at Cambridge, Massachusetts. At that time also, he was associated with Mr. Sereno Watson, then a tutor in Iowa College, in connection with whom a very complete series of local plants were collected, most of which are now stored in the Davenport Academy Herbarium, awaiting the appreciative hand of some young botanist yet to appear from the ranks of the promising Agassiz Club. It is altogether probable that in this congenial employment (in which Mrs. Sheldon took a prominent part), Mr. Watson received his first bent to botanical research, since so efficiently followed up as Botanist of the 40° parallel, and later, as the trusted associate of Prof. Asa Gray, at Cambridge, in the magnificent work of *The North American Flora*.

So, with our present subject, time moves on—full fifty years have passed over his head, full of cares and labors. Iowa College becoming involved in financial difficulties, is removed, in search of a more congenial location. Prof. Sheldon remains; his hopes still cling to Davenport as an educational center; he becomes connected with another educational institution, under the auspices of a different denomination of Christians, with whom, in a true catholic spirit, he unites, and again

assumes educational work, as professor in Griswold College. Engaging in multifarious duties; successful always in securing the affectionate regard of his pupils, giving up not only his time and abilities, but also his means to build up an institution approximating his high ideal, can we wonder that disappointment weighed heavily upon him in seeing his long-cherished plans unconsummated?

It was at this juncture, when Prof. Sheldon had nearly reached his sixtieth year, that the Davenport Academy of Sciences was organized. He was urgently requested to accept the presidency, but only consented on condition of being relieved from nominal official duty as its presiding officer. Since then, up to the last week of his life, he has been our trusted counsellor, our constant supporter, and our ever faithful friend. Whenever a word of encouragement was needed, his earnest voice was at our command; when funds were urgently required, his hand was stretched out unstintedly to our relief. Even now, in our profound sorrow for his loss, his benignant face beams on us from that precious sun-picture, saying, "BE OF GOOD CHEER!"

With what sad recollections do we recall the meeting of only two weeks ago, when, for the last—and, I might almost say, for the first time at our regular meetings—his voice was heard, in advocacy of what he considered a question of importance to the well-being of this Academy, in scathing rebuke of unjustifiable assaults on its integrity; in words of encouragement to us, who, in our feeble way, have endeavored to uphold the torch of science—memorable words, to be sacredly bequeathed to those that come after us.

It has seemed necessary to go over all this preliminary matter, in order to reach our main point, in a proper appreciation of the scientific work and character of our late associate.

Prof. Sheldon became what he was, as the combined results of his birth, his early education, and his enlarged experience. Thus, to his natural inherited gifts were added acquired virtues, all enriched by those eminent Christian graces that added a winning lustre to his personal character. Not but what he had his failings. I think it is a proper matter of regret to us all that instinctive reluctance to anything like public display prevented him from the wider exercise of his talents by giving to the scientific world, in printed form, the results of his observations and researches; his name does not appear in any of our published reports. Well do I remember an early conversation with him, in which I ventured to urge such a matter on his attention. His answer was characteristic: "That is not my vocation; *I can teach.*"

What answer could I make, when I knew that his most earnest thoughts were being printed daily on the living tablets of the hearts of his pupils, only to appear in distant results, in which the hand of the master is known only to the All-seeing Eye?

In matters pertaining to his avocation as a teacher, Prof. Sheldon's memory could be safely relied on, but to such things as related only to his personal interests, he was, at times, strangely oblivious. A characteristic instance in point will well illustrate this phase of his character: A bank deposit, to his credit, of no small amount, was allowed to accumulate for years, till the interest greatly exceeded the principal. When accidentally informed by one of the bank officials that there was such a sum to his credit, he could hardly be convinced of its truth, so completely had the whole transaction passed from his recollection. Similar instances of forgetfulness, where the debit account is on the other side, are unfortunately not rare; but, in this case the only explanation was in the man—it was Prof. Sheldon literally carrying out the Scriptural injunction of not letting his left hand know what his right hand was doing.

Most of us will remember the long shaggy-haired dog which, for so many years, was the constant companion of his daily walks. To many it seemed rather a strange attachment for a learned professor, but admits of a ready explanation. However wide apart in other respects, in both the character of friendliness and faithfulness was plainly exhibited; the dog knew that his master could be trusted to do what was kind and generous, and the master knew that a look or a sign was sufficient to enforce the strictest obedience. There was thus a bond of union established that terminated only with life.

Not in this instance alone was his natural taste exhibited in an affectionate study of animal life. At an early day in his Davenport career, in one of his rambles, he made captive a nest of flying-squirrels, and no captives ever fared better at the hands of the capturer. He at once (assisted, as in all his schemes, by his faithful wife), undertook a careful study of their habits, provided every convenience of shelter, food, and exercise for their comfort and well-being, nursed the young with his own hands and was rewarded in seeing them thrive and enjoy life under his watchful care. Soon unbounded trust took the place of instinctive fear, and they indulged their nocturnal sports in his presence, darting from place to place, but most at home when nestling in his sleeve or bosom; in fact, they would not object to make that their daily resting-place. As a matter of historic interest, it may be added that, in the

case of one of these captive pets, life was prolonged to the ripe old age of twelve years, and the same fatherly hand that nursed its infancy daintily prepared its skeleton, which now graces the Academy's collections. If now, Prof. Sheldon had only given us, in the simplest way, the information thus gained of the life-habits of these curious and obscure denizens of our woods, we should have had a gem of Natural History worthy the pen or pencil of an Audubon or Thoreau. But, alas! such information has now gone beyond our reach.

Better than all this, however, though in the same line of research, was his earnest life-study of humanity; from the obscure pages of ancient lore, in which he was well versed, he ever turned with delight, to "read that hidden book, the human heart." He studied, with ever-increased interest its manner of growth and its manifold development, never so happy as when seeing it take a wise direction, under his plastic hand. His pupils soon learned to know and recognize his power for good, and yielded to his persuasive influences; the bad were reformed, the perverted turned from their evil courses, and all that was generous, noble, and manly brought up to its full measure of excellence.

Pity that a mind so gifted, a character so ennobled, and an ability for usefulness so exalted, should not, for want of proper appreciation, have been allowed full scope for its exercise! Great pity, that disappointment in the apparent failure of his educational schemes for this, his chosen home, should have dimmed the evening of his beneficent life! With what satisfaction would those who knew him best, and, therefore, loved him most, have seen him occupy, for many years, the pleasant home erected under his own auspices, and displaying his own delicate and refined taste; his simple, every-day wants supplied by the gentle hand that had been reared under his fostering care from childhood; attaining to a green old age, surrounded by the substantial evidences of a well-spent life, and cheered by the affectionate gratitude of those who had reaped the benefit of his labors, or were made better by his wise example. But, from a higher than human source came, too soon for us, but not for him—June 5, 1886—the blessed summons: "WELL DONE, GOOD AND FAITHFUL SERVANT;"—faithful alike in few or many things—"ENTER THOU INTO THE JOY OF THY LORD!"

2/10/93

Presented to the Academy

# PROCEEDINGS

OF THE

# DAVENPORT ACADEMY

OF

# NATURAL SCIENCES.

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VOLUME V—PART II.

JAN., 1885—JAN., 1886.

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DAVENPORT, IOWA:  
PUBLISHED BY THE ACADEMY OF NATURAL SCIENCES  
1886.



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VOLUME V.

1885-1889.

DAVENPORT, IOWA:  
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1893.

**PUBLICATION COMMITTEE — 1893.**

**Mrs. M. L. D. PUTNAM, *Chairman*.**

**REV. W. H. BARRIS.**

**DR. C. H. PRESTON.**

**PROF. SAMUEL CALVIN.**

**DR. JENNIE McCOWEN.**

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The date of the printing of each sheet is printed in each signature line.

**EDWARD BORCHERT, PRINTER**

## PREFACE.

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THE Fifth Volume of the Proceedings of the Davenport Academy of Natural Sciences is submitted to the scientific public with the hope that it may be found on the same plane of worth and interest with the volumes heretofore issued.

Valuable work in various fields is shown. Of special interest are the five botanical papers of the late Dr. C. C. Parry, and to him also fell the kindly task of preparing the memorials, herein contained, of the late Prof. D. S. Sheldon, LL. D., first President of the Academy, and of the late R. Smetham. The last work of Dr. Parry's life was the paper on "*Ceanothus*, L." Only those most intimately connected with the publication of the Proceedings of the Davenport Academy of Natural Sciences can appreciate how much of success was due to the fertile brain, untiring energy, and well-earned, world-wide reputation of Dr. Parry. Many an early morning hour found him, after a brisk walk from his country home, in consultation with the Chairman. The last pages of Volume V., fresh from the press, were brought by him to the train, September 22, 1889, as the Chairman started on a journey across the seas. The farewell words were spoken, the last grasp of the hand taken, for in a brief time—February 22, 1890—Dr. Parry took the longer journey from whence no traveler returns. The publication since then has taken a long rest, ostensibly waiting for the "Index"—really paralyzed by the repeated inroads upon the membership made by death and removals.

Among the prominent supporters of the Academy who have been called away was the late Charles E. Putnam, who contributed so much to the permanent value of its publications, and whose efficient administration as President closes this Volume. The late James Thompson, whose sudden death occurred a few hours after his reelection to the Presidency, was a member of the Publication Committee. The removal of our former enthusiastic Curator, Prof. W. H. Pratt, to Minneapolis, is felt as a very serious loss.

Other willing and able hands are taking up the work in various lines, and continued generous support by the community at large, and accumulating bequests to the Endowment Fund, give every reason for encouragement in the future. Prof. Samuel Calvin, Iowa State Geologist, and Dr. Jennie McCowen are now on the Publication Committee. Prof. W. H. Barris, whose reputation as a geologist needs no mention, has taken the place of Prof. Pratt, as Curator.

On December 14, 1892, the twenty-fifth anniversary of the founding of the Academy was celebrated by a successful entertainment, one delightful feature of which was the reading by the Secretary, Dr. Jennie McCowen, of a most carefully-prepared paper, giving a concise résumé of the history and work of

the Academy. Many letters of congratulation from distant friends were read. The marked increase of the library since the distribution of the Proceedings is very gratifying. It now contains over 28,000 volumes, which are housed in the fire-proof building of the Academy.

The Synopsis of Proceedings—in which will be found, page 248, a revision of the Constitution and By-Laws, as adopted March 25, 1887—is brought down in this volume from 1885 to 1888, inclusive. A completed index of the five volumes thus far published is appended, for the preparation of which the Academy is indebted to Prof. W. J. McGee, of the United States Geological Survey, and his able assistant, Mr. Van Doren. The portrait of the late Prof. D. S. Sheldon, LL. D., as frontispiece of Volume V., was the gift of his former pupils of Griswold College, through the efforts of Mr. George F. Henry, of Des Moines.

It is the purpose of the Academy to publish hereafter in brochure form all papers accepted, as soon as possible after presentation. In pursuance of this plan, the following have already been issued as part of Volume VI.:

1. Bibliography of Iowa Antiquities, by Frederick Starr, Ph. D., of Chicago University.
2. Ancient Grooved Rocks in Arkansas, by W. A. Chapman.
3. Buddhism in America, by Edward L. Berthoud, of Golden, Colorado.

Among other papers promised are one by Prof. Calvin, of the State University, and one by Prof. Barris on the local geology of Davenport.

The portraits of Dr. C. C. Parry and C. E. Putnam will also be contained in Volume VI., with biographical sketches.

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**CEANOTHUS, L.****Recent Field Notes, with a Partial Revision of Species.**

BY C. C. PARRY.

*(Read before the Academy, August 30, 1889.)*

IN undertaking to put into systematic form the results of some special observations on the genus *Ceanothus*, included in Proceedings of the Davenport Academy of Sciences, Vol. V., pp. 162-174, the common experience of finding a lack of definite information on certain important points was naturally encountered. With a view to meet some of these in the only effectual way, the writer was induced to undertake, the present season (1889), a brief re-exploration of certain districts on the Pacific coast, affording the best promise of successful results in elucidating the doubtful points needed to clear up certain specific characters. It is always an advantage in such researches to have some definite object in view, some special doubtful questions to answer; and with these weighing on his mind, the writer felt at liberty to pass over with a mere cursory view, such matters, however interesting, that did not bear directly on the main object of investigation.

To acquire a satisfactory knowledge of the earlier-described Pacific coast species, often described from imperfect fragmentary material, it is desirable, if possible, to visit the original localities and identify the types with the living plants, thus not only settling the vexed question of synonymy, but supplying what is wanting in a complete definition of species. It has so happened in the nature of the case, that the earliest botanical explorations were mainly confined to a few accessible points on the Pacific coast, from which only a limited area of the vast interior districts could be reached, amid hardships and privations difficult to realize under the facilities of modern travel. Hence, peculiar interest attaches to such localities as the mouth of the Columbia River, the harbors of Monterey, Santa Barbara, and San Diego, rendered classical by the enthusiastic labors of Chamisso, Douglas, Nuttall, and others of less note. Treading reverently in the steps of these worthies of a past generation, as others may do later in ours, the writer enjoyed

a few days in the latter part of this season (1889), just forty years from his first acquaintance with this locality, in the modern San Diego, climbing leisurely over the then verdant hills, and threading his way amid the same maze of shrubbery through which Nuttall had struggled over fifty years ago, bringing first to the notice of Eastern botanists the floral features of this far Pacific coast, in the volume of the North American Flora. The genus *Ceanothus*, which he then enriched with so many peculiar West-American species, was here represented mainly by *Ceanothus verrucosus*, Nutt., which, though at the time of his short visit in April and May was past flowering, yet revealed to his practised eye its peculiar specific qualities. Though at the time of my visit the flowers had mainly disappeared, yet having previously observed it in all its stages of growth, it was unmistakable, being especially distinguished from the nearest related *C. rigidus* in its more supple, often somewhat pendent branches, its white or faintly tinged blue flowers, its alternate leaves, and the more strongly marked protuberances on the lower branches left by the fallen leaves, and persistent stipular bases. The figure, Pl. IX. in Mex. Bdy. Survey, referred to *C. rigidus*, is, as suggested by Professor Trelease, undoubtedly *C. verrucosus*, Nutt., which, by a misplacement of labels, is credited to "Monterey, Parry." As far as now known, this species is confined in its geographical range to San Diego, extending southward into Lower California. It can in no way be confounded with the widely spread *C. cuneatus*, Nutt., the points of distinction being clearly laid down in the original description.

Reversing the order of Nuttall's journey from north to south in 1836, the writer spent the first week of April in the picturesque Ojai Valley, near Santa Barbara, probably covering the same time of year as Nuttall fifty-three years before. Previously I had received from General John Bidwell and wife, then wintering at this sanitary retreat, some intimation of the floral features of this locality. It was, therefore, a rare treat to avail myself of their extended observations in driving over the adjoining country as their guest. Though rather late to see in its perfection the full development of inflorescence of the different species of *Ceanothus* there represented, it was particularly pleasant to think that Nuttall had made his observations of these plants about the same time of year, in a closely adjoining district.

Foremost of these to attract attention was the luxuriant *C. spinosus*, Nutt., here attaining the size of a small tree, 15 to 20 feet in height, and with trunks not infrequently 8 inches in diameter. Though low-branched and usually of scrubby growth, it is here sufficiently abundant

to be cut for fuel, showing a dense cherry-red heart-wood, from whence it has derived the common name of "red wood." Its inflorescence is copious, on prolonged thryses, the flower of a light faded blue, the forming fruit scarcely lobed, and strongly resinous coated.

In a systematic point of view, special interest attaches to the species from this locality first described by Nuttall as *C. hirsutus*. While easily recognized from the description in this, its original locality, it has been confused in points farther north and south by an erroneous reference to *C. sorediatus*, Hook. & Arn. Being particularly anxious to clear up, if possible, this confusion, the species has been traced as far as practicable in its southern extension with the conclusion since fully confirmed, that all the southern forms belong to *C. hirsutus*, and while not as yet fully informed as to its northern range, I am of the opinion that it does not overlap or mingle with the true *C. sorediatus*, the character and range of which latter I am now able, as will be shown farther on, satisfactorily to define. It must suffice at present to offer the following notes on *C. hirsutus* as seen in its original locality:

*C. HIRSUTUS*, Nutt., Fl. N. Am., I., p. 266. Four to twelve feet in height, branches spreading, rather slender, light brown on the older stems, occasionally covered with small glandular warts, younger branches strongly hirsute; leaves ovate to broadly cordate, petiolate, finely glandular-serrate, dark green above with more or less hispid pubescence, paler beneath with conspicuous triple and intermediate veins, hispidly ciliate; flowers bright or light blue, inflorescence more or less prolonged; fruit rather conspicuously crested, 4 mm. broad. As seen in its southern range, extending into Lower California, it occasionally assumes an arborescent aspect. According to the views of Mr. Brandegee, *C. arboreus*, Greene, would represent the insular form of this species, though few may be willing to accept his conclusions.

Another typical Santa Barbara species is *C. divaricatus*, Nutt. This is one of the most easily recognized species, varying in size from a low bush to a medium sized tree, with light colored glaucous bark, rigidly spinose branches, light green leaves, usually entire, but not infrequently, especially on vigorous shoots, irregularly serrate, inflorescence diffuse, flowers dull faded blue; fruit orbicular, with scarcely any protuberances. It may be here remarked that the swollen protuberances appearing as lobes or crests on the back of the *cocci* are always most conspicuous on the young forming fruit, which shrink away more or less at maturity. The accessory intermediate appendages common in the *Cerastes* section often persist as projecting horns.

My investigations in this interesting vicinity were not sufficiently early in the season or extended in range to meet with *C. megacarpus*, Nutt., the peculiar floral characters of which not coming under the notice of Nuttall, have been noted by Professor Greene in Bull. Cal. Acad., III., pp. 80-81. The change in nomenclature from *C. macrocarpus*, Nutt., to *C. megacarpus*, Nutt., though clearly stated by Nuttall himself (Nutt. Sylv., II., p. 46), has, strangely enough, not as yet been taken up by recent systematic writers. As the validity of the earlier *C. macrocapus*, Cav., of Mexico, is admitted (Hemsley's Biol. Cen. Am., I., p. 199), there remains no valid reason for not accepting the necessary correction which, though merely verbal, sufficiently distinguishes the separate species.

*C. IMPRESSUS*, Trelease, from the Santa Ynez Mountains, did not come under my observation. Though imperfectly known, its well-marked characters seem sufficiently to distinguish it.

Reaching Oakland in mid-April, pleasant and commodious quarters were kindly offered as a guest in the botanical eyrie where the Lemmon Herbarium is located. Here, overlooking the busy, bustling town, above its noise and dust, the verdant slopes encircling the bay of San Francisco presented ever-attractive views. In the latter days of March, Professor Greene had gathered from Mt. Tamalpais luxuriant flowering specimens of a *Ceanothus*, which I soon recognized as the species which, from imperfect material, I had characterized as *C. intricatus*, Parry, l. c. To my surprise I also found, through Mr. Greene, that the same species had been in cultivation for several years in the private grounds of Professor Rivers, at Berkeley, as well as the University Botanic Garden. So that the material for clearing up this species seemed close at hand, without requiring the climb to the summit of Mt. Tamalpais. It also suggested a strong probability, since verified, that this might more properly belong to an old established species. In order to verify the original facts, however, I visited the lower slopes of Mt. Tamalpais on April 30th, finding the species fairly represented, then in forming fruit, while at the same time the mountain slopes were brilliant with the profusely clustered thyrses of *C. thyrsiflorus*, Esch. Not allowing this elegant display to distract my attention from its lowlier compeer, which, a full month before had its flowering season, thus obviating any risk of confused forms resulting from hybridization, I note herewith the characters then and subsequently observed, postponing till later the question of its systematic relations, viz.:

A densely-branched shrub, 3-8 feet in height, light or reddish-gray

bark, occasionally covered with patches of resinous warts, younger branches with a short, appressed pubescence, mixed with longer, scattered hairs; leaves short-petiolate, elliptic to ovate, 20–30 mm. in length, 10 mm. broad, much smaller on the secondary branches, smooth above, in the fresh-growing shoots coated with a light varnish, finely ciliate-glandular, rarely in vigorous shoots crenately margined, paler beneath, with ciliate hairs on the veins, distinctly triple-nerved; stipules rather rigid, and often covered with an adhesive resinous varnish; inflorescence more or less prolonged beyond the leaves, compactly oval or loosely thyrsoid, flowers bright blue; fruit 4 mm. broad, smooth, without crests. In cultivated specimens where the growth is prolonged by irrigation, the dense branches with their deep green, glossy foliage form neat, compact clumps, fully justifying the proposed name of *intricatus*.

It was reserved for a quiet closet retreat, 2,000 miles from its place of growth, to determine the true systematic relations of this species, and correct the synonymy. Being particularly desirous to settle definitely the early described species, *C. sorediatus*, Hook. & Arn., I applied by letter to Professor Watson, at Cambridge, Mass., and also to the Herbarium of the Royal Gardens, at Kew, England, for any fragments that might be spared of the typical Douglasian specimens. With the usual courtesy, I was favored with two leaves from Cambridge, and a somewhat larger fragment from Kew, kindly supplied by Mr. J. G. Baker, of that world-renowned institution. I at once recognized that these specimens were identical with the plant above described, and that the *C. intricatus*, Parry—fortunately not widely distributed—should be reduced to a synonym of *C. sorediatus*, Hook. & Arn.

Having thus clearly and satisfactorily defined the true *C. sorediatus*, Hook. & Arn., also determining its proper geographic range, not apparently extending far south of San Francisco Bay, it became necessary to re-examine the various forms which had been erroneously referred to this species. The suggestion of Professor Trelease in his recent notes on *Ceanothus*, that probably "one or more species may ultimately be separated" from the diverse plants included under *C. sorediatus*, Hook. & Arn., by more recent authors, must here receive verification.

Thus, the specimens from the Upper Sacramento Valley, at Ione, which, in my recent paper, I took to represent the typical *C. sorediatus*, Hook. & Arn., and sparingly distributed under that name, proves to be the first one calling for separation. As this can be quite satisfactorily

identified from the description with *C. azureus*, Kell., Proceed. Cal. Acad., I., p. 55 (1855), and from actual specimens of Bolander, No. 4,558, *vide* Watson (4,548 Herb. Cal. State University), I am obliged to regard it as a well-marked, undescribed species, and, being precluded from the use of personal names in the fact that it had passed through the hands of several collectors under different names, I herewith characterize, viz.:

C. TOMENTOSUS, n. sp. *C. sorediatus*, Parry, l. c., not Hook. & Arn. Character transferred and enlarged.

Four to eight feet in height, with slender branches light gray or reddish, younger shoots densely rusty-tomentose, deciduous on the older branches; leaves short petiolate, sparsely scattered on the branches, with short fasciculate branches in the axils, oval to sub-cordate, 10-25 mm. in length, dull green, smooth above, tomentose beneath, strongly triple-nerved from the base, irregularly and coarsely glandular-serrate, occasionally sub-lobed; inflorescence compact or oval, on short or more or less prolonged peduncles, flowers intense azure; fruit 3 mm. broad, with inconspicuous crests at maturity.

*Habitat*.—Known to the writer only from the brown sandstone ledges of Ione, Amador County, associated with *Arctostaphylos myrtifolia*, Parry, flowering in March, fruit in May.

The necessary changes in the synoptical list, Parry, l. c., will be indicated in the systematic summary at the close of this paper.

On revisiting the always attractive botanical locality of Monterey, so replete with historical associations, I lost no time in exploring the brushy wastes north-east of Hotel del Monte, near where, in 1850, I had collected the typical *Ceanothus dentatus*, Torr. & Gray, from which specimens was drawn the excellent figure, Plate X., Bot. Mex. Bdy. Survey. In my recent paper, Proceed. Dav. Acad., V., p. 171, I had been inclined to discredit this species, regarding it as a reduced form of *C. papillosus*, Torr. & Gray, without the papillæ. But here on the ground, while still fresh from a view of *C. papillosus* at its near home in the Santa Cruz Mountains, the question was soon to be settled. So, in struggling through a thicket of *Adenostoma*, my eye was attracted by a low-branching shrub, with crumpled, varnished leaves of a yellowish-green aspect. This, on closer inspection proved to be the genuine *C. dentatus*, probably from the original locality whence Douglass procured his specimens. It did not take more than a glance (though I had made many before on dried specimens) to show that it was clearly distinct. Much of the confusion that has heretofore attached to this species is

due to the fact that the published descriptions since the original, Torr. & Gray, N. Am. Fl., I., p. 268 (which is clear enough except in the statement of flowers being white), have been made to cover at least two very distinct species, especially the one I have recently distinguished as *C. foliosus*, Parry, l. c.

At the time of my visit, May 12, it was already past flowering, except some belated shoots which belonged rather to a second forced growth the present season. In these the bright blue color was conspicuous, but there was lacking the prolonged peduncle of the regular flowering season. This fact suggests an explanation that would seem to justify the proposed union of *C. floribundus*, Hook., with *C. dentatus*, Torr. & Gray, the former being known only in cultivation, and mainly distinguished from the latter in its condensed inflorescence, which may reasonably be regarded as due to the widely different condition of cultivation in a remote district.

From detailed notes then made on the spot, as well as a subsequent visit six weeks later, the following additional *data* are herewith given as representing the genuine *C. DENTATUS*, Torr. & Gr. :

Three to four feet in height, densely-branched spreading, with reddish bark on the older stems, inclined to be angular on the younger shoots by the decurrence of the petioles; leaves short petiolate, densely fasciculate in the axils, variable in size, 10–25 mm. in length, oblong ovate in outline, by the strongly revolute margins and inflexed tip assuming a truncate wedge shape, smooth, light yellowish green above, canescent hairy below, with strongly pinnate veins, irregularly toothed, tipped with conspicuous stalked glands; stipules conspicuous, often coated with a resinous exudation; inflorescence terminal, globular, on prolonged peduncles, or in premature shoots later in the season showing a prolonged leafy spike; fruit 4 mm. broad, distinctly crested, the resinous coated epicarp deciduous at maturity. Flowering in March, fruit in May.

In the latter part of May, and early June, a trip was made to the Upper Sacramento, with a special view to study the different phases of the somewhat variable but easily recognized *Ceanothus integerrimus*, Hook. & Arn. The results helped to confirm the view previously expressed in regarding all the forms so widely spread through the mountain districts of California as properly belonging to a single somewhat variable species. Thus, in passing over the country in various directions at lower or higher elevation, it was everywhere noted as a graceful, slender-branched shrub, displaying its more or less prolonged thyr-

soid inflorescence in every shade of color from pure white to faded or bright blue. In passing to a higher elevation the flowering period was correspondingly delayed, so that even in a short day's journey the plant could be seen in every stage of growth, from bud to forming fruit. The tendency was also manifest to assume smaller forms at the higher points, thus corresponding to the variety *parvifolius*. Watson. It may also here be noted that even the entire leaved character is not constant, as vigorous shoots show not infrequently irregular serratures. In the same connection it may also be stated that seedlings of other entire leaved species are deeply and sharply serrate. But these observations, important for the time being, became secondary in interest to the study of another species on the rocky slopes of the Upper Sacramento, which could not properly be referred to any described form. Copious notes and collections then made confirmed this view, and subsequently the same species turned up in collections made by Mr. and Mrs. Lemmon in Plumas County the present season. Professor Lemmon, in sending specimens with accompanying notes in a letter, stated that he had collected the same as early as 1874. It was then passed over hastily at Cambridge as a mountain variety of *C. thyrsiflorus*. Mr. Lemmon, not satisfied with this determination, re-collected and examined more carefully on his recent trip to the Sierras, and, our views coinciding on its specific character, with his consent I take pleasure in commemorating a long and pleasant botanical association by naming as *CEANOTHUS LEMMONI*, n. sp. :

Two feet high or less, spreading with rigid branches, bark lightish gray, more or less hairy pubescent on the younger stems; leaves narrowly elliptic to oval, 10 to 25 mm. in length, smooth above, ciliate pubescent on the veins beneath, glandular-serrate, the serration most distinct on young, vigorous shoots; stipules somewhat rigid; inflorescence short on prolonged leafy peduncles, flowers of a bright or faded blue color; fruit 4 mm. broad, conspicuously crested.

*Habitat*:—Johnson's Ranch, near Quincy, Plumas County, Lemmon, 1874—May 30, 1889. Rocky slopes of the Upper Sacramento Valley, 1888–89, C. C. Parry.

In herbarium specimens this species has probably been heretofore referred to *C. procumbens*, Watson, from which it differs essentially in its rigid habit, its less expanded foliage, and different form of fruit. On the ordinary travelled route to the Yosemite, where *C. procumbens* is conspicuous, spreading over the ground a soft carpet of verdure, the

ordinary traveller—much less the observing botanist—would find little difficulty in recognizing the distinction, whether by foot or eye.

In conclusion of the above rather desultory notes, though recording the results of careful, conscientious observation, it may be well to present the following condensed summary:

## SYSTEMATIC SUMMARY.

CEANOTHUS SOREDIATUS, Hook & Arn., Bot. Beech., p. 328.

———, Torr. & Gray, N. Am. Fl., I., p. 686.

———, Watson, Proceed. Am. Acad., X., p. 336, excl. Bolander, No. 4,558.

———, Trelease, Proceed. Cal. Acad. Sci., 2 series, p. 111, excl. geographical range.

*C. intricatus*, Parry, Proceed. Dav. Acad. Sci., V., p. 168.

To be included in synoptical list, Parry, l. c., as No. 9, p. 168, in place of *C. intricatus*.

CEANOTHUS TOMENTOSUS, Parry. See page 190.

*C. azureus*, Kell., Proceed. Cal. Acad., I., p. 55.

*C. sorediatus*, Watson, l. c. in part, Bolander 4,558–(4,548)?

———, Parry, l. c., not Hook. & Arn.

In synoptical list, Parry, l. c., to follow *Ceanothus hirsutus*, Nutt., as No. 15<sup>2</sup>. In group III., substitute HIRSUTUS for SOREDIATUS.

CEANOTHUS LEMMONI, Parry. See page 192.

In synoptical list, Parry, l. c. to follow *C. decumbens*, Watson, as No. 4<sup>2</sup>.

CEANTOHUS DENTATUS, Torr. & Gray., N. Am. Fl., I., p. 268.

*C. floribundus*, Hook., Bot. Mag., t. 4,806.

———, Watson, l. c., p. 338.

*C. dentatus*, sub-sp. (?) *floribundus*, Trelease, l. c., p. 112.

*C. papillosus*, var. *floribundus*, Parry, l. c., p. 171.

———, var. *dentatus*, Parry, l. c., pp. 170-71.

CEANOTHUS ORCUTTII, Parry. See note page 194.

The restoration of *Ceanothus dentatus* with the additional new species, *C. tomentosus*, *C. Lemmoni*, and *C. Orcuttii* increases the number of species in synoptical list, Parry, l. c., to 36, or, excluding Mexican species, to 33.

NOTE.—Since the completion of the above paper, I have received fruiting specimens of the following, viz. :

*CEANOTHUS ORCUTTI*, n. sp.

Branches flexible, dull reddish, with short, hispid pubescence; leaves petiolate, broadly orbicular to oblong-cordate, usually rounded obtuse, 30 to 40 mm. in length, often as broad, irregularly glandular-serrate, sparingly hispid above, strongly triple-nerved beneath, with prominent hairy ciliate veins; inflorescence axillary, oval scarcely exceeding the leaves, rather compact, with pubescent rachis, and smooth pedicels; flowers apparently white or light blue (seen only in fallen fragments); fruit glandular-hispid, with corrugated resinous epicarp, and conspicuous crests; seeds light brown.

*Habitat*.—High mountains east of San Diego, C. R. Orcutt, May and July, 1889. Remarkable for its glandular-hispid fruit, nearest allied to *C. sanguineus*, Pursh., and to succeed it in the synoptical list as No. 3<sup>2</sup>.

SYNOPSIS OF PROCEEDINGS  
OF THE  
Davenport Academy of Natural Sciences,  
1885 — 1888.

[In this abstract of the proceedings of the Academy the records of routine and unfinished business or unimportant matters are omitted.]

*January 7, 1885.*—ANNUAL MEETING.

President Fulton in the chair; twenty-nine members and a number of visitors present. Report of officers postponed to next meeting.

On motion of Hon. George H. French the following resolution was adopted:

*Resolved*, That the best interests of the Academy require that only the interest accruing from the Endowment Fund and any bequest that the Academy may receive, shall ever be used by the Trustees for current and other expenses.

ELECTION OF OFFICERS.

*President*—C. E. PUTNAM.

*First Vice-President*—C. E. HARRISON.

*Second Vice-President*—J. B. PHELPS.

*Recording Secretary*—Miss LUCY M. PRATT.

*Corresponding Secretary*—W. H. PRATT.

*Treasurer*—W. H. FLUKE.

*Librarian*—Dr. JENNIE McCOWEN.

*Curator*—W. H. PRATT.

*Trustees for Three Years.*—Dr. E. H. HAZEN, T. W. McCLELLAND, C. E. HARRISON, WILLIAM RIEPE.

On motion of Rev. A. M. Judy, the following resolution was adopted:

*Resolved*, That one hour of the regular monthly meeting be devoted to scientific discussion.

*January 30, 1885.*—REGULAR MEETING.

President C. E. Putnam in the chair; fifteen members present.

Deferred reports were presented as follows:

The annual report of the Treasurer, Mr. W. H. Fluke, shows the receipts during the past year to have been \$870.08; expenditures, \$839.87; leaving a balance in the treasury of \$30.21, which, together with the Endowment Fund, leaves a total balance of \$896.95.

L. M. Pratt's report, Recording Secretary, develops some interesting figures. There was an average attendance of eleven. Five opera house entertainments were given under the auspices of the Academy, and Washington's birthday was observed. Total regular members, 150; life members, 79; elected during the year, 10. There were 1,974 paying visitors to the Academy, 1,017 visiting members, and 1,507 visitors by invitation, business calls, etc., making a total of 4,498.

## CURATOR'S REPORT.

## TO THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

In regard to the condition and progress of the Academy museum for the past year I would respectfully report:

The principal accessions to the archaeological department consist of the contents of twenty-three boxes and barrels of relics from the southern mounds, collected and forwarded by Capt. W. P. Halk. The relics are principally ancient pottery, a large portion of which is secured in a fragmentary condition. The broken vessels have been partially restored, leaving considerable work to be done to complete it.

The collections of the year comprise over two hundred earthen vessels, including a very considerable variety of forms. The most of these are packed away for the present, as the cabinet cases are fully occupied and none have been added during the year. With the pottery came a variety of stone, flint, and bone implements, and nine mound skulls in fair condition. The collection of human crania now number 124 well-preserved specimens. A small collection of flint, agate, and bone implements has also been received, collected during the summer on the site of an old Maundon town near the banks of the Missouri River, at Le Beau, Dakota. No explorations of mounds in this vicinity have been made by the Academy or its members except some work by Rev. J. Gass, in the north-eastern part of the State, which is described in a paper from him presented at the December meeting.

In the natural history department eight stuffed birds have been presented by Dr. S. C. Bowman, and a stuffed alligator, half-grown, a fine specimen, by D. J. W. Viele.

Mr. H. A. Pilsbry has collected several species of aquatic shells new to this locality, and he has prepared a catalogue, now nearly completed, of the whole collection of shells in the museum.

In geology and palæontology, Professor Barris has contributed some new species, described in papers recently published.

Rev. J. Gass forwarded a box of Silurian fossils from Allamakee County, and M. A. L. Mueller, of Sioux City, contributed an interesting limestone fossil, undetermined, from that locality. The historical department has received from Dr. E. S. Barrows the likenesses of several of the early settlers of this city, and a considerable number of interesting relics have been added by various contributors. On the whole, the growth of the museum has been rather less than during several preceding years, and this is due to want of a sufficient number of active working members; want of funds for prosecuting researches and preparing specimens, and want of cases in which to arrange what is acquired. Nearly all the available space for cases in the building is now occupied. We could, however, put in the basement four or five similar to those already there, and they would be very desirable for collections in local and systematic geology and mineralogy, which are very much needed. With such collections we could interest and aid the pupils of the high schools of this and the closely adjacent cities, and their hitherto occasional visits would become more frequent and regular. This requires more means, and especially more attention. A good foundation has been laid and a great deal of earnest, effective work done, but the whole is incomplete. The opportunity is a grand one for building up an institution which shall be a constantly growing stimulus and aid to studies in natural science, and to public education. To do this will require not only continued but greatly increased active membership and active support on the part of the community at large. For the development of earnest and thorough students and workers in practical science, much is to be hoped from such organizations as the Agassiz club of young men, which is now holding regular meetings here, and every effort should be made for the encouragement of that and similar associations.

#### LIBRARIAN'S REPORT.

MR. PRESIDENT:

I have the honor to report that during the year there have been one thousand five hundred additions to the library. We have received, in exchange for our Proceedings, the proceedings and publications of one hundred fourteen scientific institutions and societies of this country, and of one hundred ten foreign institutions; almost all the government reports; all the state public documents; twenty monthly journals, chiefly scientific; sixteen weeklies, chiefly agricultural and mechanical; five general newspapers in addition to the city dailies, together with about one hundred transient papers containing articles of scientific or archæological interest. Additions of value have been made under the heads of Physics, Astronomy, Meteorology, Geology, Mineralogy, Botany, Entomology, Archæology, Anthropology, Agriculture, Education, Biography, and History.

In order to make this really valuable collection available, more shelf-room is necessary. Some preliminary steps have been taken in regard

to cataloguing, and it is hoped that the ensuing year may find something accomplished in this direction.

In order to render the large number of scientific, agricultural, and mechanical journals and papers useful to the community and to the society, I would suggest the propriety of placing them on file in one of the lower rooms, where they may be available for reference.

All of which is respectfully submitted.

JENNIE McCOWEN, M.D., *Librarian.*

#### PUBLICATION COMMITTEE'S REPORT.

MR. PRESIDENT, LADIES, AND GENTLEMEN:

Never since the inauguration of the publication of the Proceedings of the Davenport Academy of Natural Sciences, in 1875, has the outlook been more encouraging than at the present time, or a deeper interest taken in the work, both at home and abroad. Applications for the previous volumes are constantly received, while exchanges have continued to come from almost every known scientific society in the world.

Volume IV. is a direct outgrowth of a list from Professor W. H. Holmes, in September, 1883, through whom the Bureau of Ethnology made an offer to publish wood cuts of all the most important pieces of pottery in the Museum of the Davenport Academy of Natural Sciences for our own publication, afterwards using the same cuts for the volume of the Smithsonian report. The Academy at a formal meeting accepting this offer, your committee were instructed to proceed with the work, and raise the necessary funds by subscriptions to Volume IV., donations, and entertainments.

The first form of Volume IV. came from the press November 18th, 1883, and form 13, page 120, December, 1884.

Over one-third of Volume IV. is completed, and about one-third more in press. It is proposed to close this volume with a synopsis of the records of the past four years ending with 1884.

MRS. M. L. D. PUTNAM, *Chairman.*

#### PRESIDENT'S ANNUAL ADDRESS.

BY H. C. FULTON.

LADIES AND GENTLEMEN:

Upon retiring from the office of President of the Academy at this, the close of my term, I wish to call your attention to the present condition of the institution, and make a few suggestions. The year past has not been one of remarkable growth for the Academy, but has been one of progress, and the reports show the institution to be in better condition to-day than ever before. Meetings have been regularly held throughout the year, and the attendance has been good, though there has been a failure to make them of sufficient interest, and too much time has been consumed in the routine business of the

Academy, and not enough given to scientific study and discussion. This fault should be corrected, and provision made to give interest to the meetings, and make them a means of scientific study. One step in this direction (and one which has been before suggested), is to provide for the discussion, at each meeting, of some topic of scientific interest, and in this way stimulate thought and research, and make the Academy what it is intended to be—an educational institution. The Curator's report shows a steady growth in all departments of the Museum, though not so great as during many other years. It is to be regretted that we lack shelf space to properly exhibit much valuable material which is now packed away, and as the present cases are now filled to their utmost capacity, and almost all case room utilized, there seems to be no way out of the difficulty excepting to erect the proposed front of the Academy building, and it is to be hoped means may be provided at an early date to provide a fund for this purpose.

The Publication Committee has performed much labor in the past year, and has now in preparation and in hand some of the most important and valuable work ever attempted in this department of the Academy, for the particulars of which you are referred to its report. The importance of our publications demands that it should be continued so far as means can be provided, and that its compilation embrace papers only of scientific value, with such matters of Academy details and business proceedings as are absolutely necessary. As our publications go into all civilized countries, and have done so much to inform the world of our work, and thus add to the Academy's reputation and to its wealth through exchanges and acquaintance, they should be placed on a high scientific and literary basis, and be ably and carefully edited. Through the instrumentality of our publications has the library been largely added to, as shown by the Librarian's report. The demand for more library room, binding of serials and pamphlets, and a complete catalogue is very pressing and should be provided for as early as possible—particularly the catalogue, on which depends, to a great extent, the value of the library.

The report of the Treasurer makes a most gratifying showing; the receipts of the year being sufficient to pay all expenses, and, with the dues yet unpaid and collectible, sufficient to cancel the indebtedness carried over from 1883. The Treasurer's books show a large sum due the Academy, but uncollectible, and the same should be charged to profit and loss, and the members delinquent in their dues stricken from the roll of membership. The financial showing is very encouraging when it is remembered there have been no extraordinary receipts during the year, excepting about \$250 received from the lecture course of last winter, which was the only appeal made to the public.

The Endowment Fund of the Academy is now about \$1,000, and will shortly be increased \$250, by the bequest of the late Robert McIntosh. I heartily concur in the resolution adopted at the last annual meeting, declaring it to be the desire of the Academy that all endowments should be held inviolate, and only the interest used. The future prosperity of the Academy will, to a great extent, depend upon endow-

ments, and every effort should be used to encourage the growth of that fund, by sacredly preserving it, that it may yield interest, which, it is hoped, will in time pay the running and working expenses of the Academy. "To him that hath shall be given," and a growing endowment fund will draw and increase to itself.

The increase in membership during the past year has not been very great, and, as we rely upon the annual dues to pay the running expenses of the Academy, the membership should be increased, the best means of doing this being to give such interest to the Academy proceedings as will create a desire on the part of intelligent people to join in its work.

The greatest need of the Academy at this time seems to be active workers. We have in the past been greatly blessed by having an efficient corps of laborers, whose work is shown in every department; but we need new material to add to and fill the ranks as the older members are compelled, from any cause, to cease their labors. To this end we should present every inducement and encouragement to scientific study, and offer every facility possible for that purpose, by having the museum and library in as good working condition as possible, and by our meetings and publications interest the people in science.

During the past year we have been called upon to mourn the loss of two members, death having taken from us Dr. R. J. Farquharson and Dr. George Englemann.

A resolution of thanks was received from the Agassiz Chapter for the free use of rooms and accommodations for their meetings.

#### THE STANDING COMMITTEES

were then announced, as follows:

*Finance*—W. H. Fluke, G. P. McClelland, Rev. A. M. Judy, H. C. Fulton.

*Publication*—Mrs. M. L. D. Putnam, Prof. W. H. Barris, Dr. C. C. Parry, James Thompson, Dr. C. H. Preston.

*Museum*—W. H. Pratt, William Riepe, Prof. D. S. Sheldon, Prof. W. H. Barris, Capt. W. P. Hall, E. P. Lynch, Miss Julia Sanders.

The following paper was presented by title, and referred to the Publication Committee: "Discovery of the Oldest Historical and Astronomical Inscriptions of North America," written in the year 2400 B. C., by G. Seyffarth, Ph. and Th. D.

On motion of Dr. Preston, the following resolutions were adopted without dissent, as stating more fully the sentiments of the Academy in regard to the attack of Mr. Henshaw:

**WHEREAS,** The Second Report of the United States Bureau of Ethnology contains an unjust and gratuitous attack upon the honor and good faith of this Academy and some of its members, calling into question the genuineness of certain articles in its museum; and

**WHEREAS,** Such attacks must tend to impair and destroy the usefulness of such collections, and to discourage earnest and faithful workers in their disinterested labors; therefore

*Resolved,* That justice and the interests of science imperatively demand a complete refutation of these charges, and vindication of the character of the parties attacked, and especially of our honored associate, Rev. J. Gass; and

*Resolved,* That the following paper, prepared by Mr. C. E. Putnam, President of the Academy, and, as we are fully satisfied, representing the whole matter in all truth and fairness, be adopted as our reply to the articles in question; and

*Resolved,* That copies of said paper be published immediately, under the direction of the Academy Publication Committee, in pamphlet form corresponding with the Academy "Proceedings," and that the same be distributed, as far as possible, to parties who receive the said Report of the Bureau of Ethnology, and to all known archaeological associations and individual collectors and explorers, and to all publishers and writers on the subject, and that a record be kept of all to whom it is sent.

*February 6, 1885.*—SPECIAL MEETING.

President Putnam in the chair; thirteen members and twenty-five visitors present.

Professor T. H. Jappe gave an address on "Kant's Philosophy of Religion."

*February 27, 1885.*—REGULAR MEETING.

Vice-President C. E. Harrison in the chair; ten members present.

Mr. H. C. Fulton, chairman of the Committee on the "Carnival of Nations," reported net proceeds amounting to \$450. On motion of Dr. C. H. Preston, a vote of thanks was tendered to all who contributed to make the entertainment a success and a memorable event.

Reports of officers presented.

The paper (illustrated), by Dr. J. W. Hoffman, of Washington, D. C., entitled "Aboriginal Art in California and Queen Charlotte's Island," was read and discussed.

*March 4, 1885.*—TRUSTEES' MEETING.

President C. E. Putnam in the chair. Nine members present; also four members of committees in attendance, by request of the President.

*Voted*, To purchase of Mrs. P. V. Newcomb a strip of four feet adjoining the Academy lot along its north line, at eighty dollars (\$80) per front foot.

*Voted*, To provide increased space for books by erecting additional shelving on both the east and west walls in the library room.

*Voted*, That the salary of the Curator for the current year be five hundred dollars (\$500).

*Voted*, That \$112.50 borrowed from the Endowment Fund several years ago be returned to that fund.

*Voted*, To ratify the action of Library Committee in subscribing for the Scientific American and Supplement, Science and Popular Science Monthly.

*March 27, 1885*—REGULAR MEETING.

President C. E. Putnam in the chair; eleven members present.

Reports of officers presented.

Mr. James Thompson read a paper on "Evolution of Dress." The Agassiz Society being in session in an adjoining room, adjourned on invitation to hear the paper, and filled the room. An interesting discussion followed the reading of the paper.

*April 20, 1885*—TRUSTEES' MEETING.

President C. E. Putnam in the chair; ten members present.

Mr. Putnam reported the purchase of the four feet of land adjoining the Academy lot, and a note given for the amount, \$320, for one year, at 8 per cent interest.

*Voted*, To invest \$1,000 now in the savings bank in good real estate security at the best rates obtainable.

*April 24, 1885*—REGULAR MEETING.

President C. E. Putnam in the chair; nine members and one visitor present.

Reports of officers read and filed.

A biographical sketch of Dr. R. J. Farquharson, by Dr. D. W. Middleton, was, in his absence, read by Dr. C. H. Preston, and referred to the Publication Committee.

*May 29, 1885*—REGULAR MEETING.

President C. E. Putnam in the chair; ten members present.

Reports of officers read and filed.

Photographs of Painted Rocks of Rio Grande County, Colorado, sent to the Academy by Mr. Maguire, were inspected by members, and description of same read.

A letter was read from Capt. W. P. Hall, stating that on August 18th, 1876, he came upon a small pen on the banks of Rock River, in which an Indian was sitting, sunk in the earth about even with the head, not covered, and in a bad state of decay, the stem of his pipe still between his teeth. He was of the Musquakie or Fox tribe. On May 28th, 1885, he again visited the same locality, and, digging about one foot of earth and leaves away, found two hatchets, one pipe, and a spear head (the wood being too rotten to save), which he donated to the Academy in the name of his daughter, Miss Grace Hall. The bones he left undisturbed.

A letter was read, also, from Dr. C. C. Parry, giving an account of "A Visit to Blakemore Ethnological Museum, at Salisbury, England."

Mr. A. S. Tiffany then read a paper on "Subsidence and Erosion."

*June 26, 1885.*—REGULAR MEETING.

Vice-President C. E. Harrison in the chair; ten members present.

Marquis de Nadaillac, of Paris, was elected a corresponding member.

Dr. E. H. Hazen read a paper on "Sanitation as a Profession," which was followed by a discussion.

*Resolved*, To grant request of Agassiz Chapter to use Academy Hall and specimens for an entertainment on July 4th.

*August 28, 1885.*—REGULAR MEETING.

President C. E. Putnam in the chair; eight members and five visitors present.

Letters were read in regard to the Henshaw attack on the Academy from the following persons: Dr. E. H. Davis, S. A. Miller, Rev. J. P. MacLean, Dr. W. DeHass, E. P. Vining, W. E. Barnes, Dr. D. G. Brinton, Prof. F. W. Putnam, Marquis de Nadaillac, Prof. Alex. Winchell, Dr. J. B. Holder, J. Henry Comstock, Max Uhler, Prof. J. Thorburn, C. Hirschfelder, Dr. S. D. Peet, and several others.

*Resolved*, That the papers and correspondence referring to the Henshaw paper, and the reply thereto be referred to the Publication Committee with power to act.

*October 30, 1885.*—REGULAR MEETING.

President C. E. Putnam in the chair; sixteen members present, and members of Agassiz Chapter and visitors to the number of fifty-two.

Dr. W. DeHass, of Washington, D. C., being present, routine business was deferred to an adjourned meeting, and the audience listened with great interest to his address on "The Ancient Mounds of America."

Dr. C. C. Parry having returned from Europe, gave an account of his visit to the Blakemore Museum, making special mention of a very large collection of American Mound relics there displayed.

*November 21, 1885.*—TRUSTEES' MEETING.

President C. E. Putnam in the chair; eight members present.

Finance Committee reported having loaned \$1,000 of Endowment Fund to Daniel Preston for five years, at 8 per cent interest, payable semi-annually, secured by mortgage on a farm appraised at \$3115.25.

*Voted*, To dispense with door-keeper, and make admission to Museum free after January 1, 1886.

*Voted*, That the Curator be authorized to make the exchange desired by Dr. DeHass, of specimens of pottery from our collection for other articles; also, to send Prof. F. W. Putnam, for the Peabody Museum, one specimen of the large pots received from the South.

Mr. Fulton, on the payment of \$50, was made a life member.

Bills for matting and repairs, to the amount of \$21.45, were allowed and ordered paid.

*November 27, 1885.*—REGULAR MEETING.

President C. E. Putnam in the chair; ten members present.

Professor R. Ellsworth Call, Moline, Illinois, was elected a regular member, and Mr. W. A. Chapman, Okolona, Arkansas, a corresponding member.

Mrs. Putnam reported that Professor J. P. MacLean, of Hamilton, Ohio, had given a lecture on November 25th, on the "Ancient Mounds of Ohio," for the benefit of the Academy, the net proceeds of which were \$15.00.

Chairman of Publication Committee reported that Volume IV. of the Proceedings had been printed, except an appendix now in course of publication, and that more subscriptions to the volume are needed to meet the expense of its publication.

The President laid before the Academy a correspondence between himself and Dr. Cyrus Thomas, Superintendent of the archæological explorations of the Bureau of Ethnology, said correspondence having been opened by Dr. Thomas. He gave extracts from a letter purporting to come from a member of the Academy to a member of the Bureau, which were of a character highly derogatory to the honor of some members of the Academy.

On motion, the following resolution was unanimously adopted:

WHEREAS, The correspondence of Prof. Thomas with President Charles E. Putnam has been submitted to the Academy; therefore, be it

*Resolved*, That the Academy extend a cordial invitation to Prof. Thomas, previous to his proposed publication, to visit its Museum, inspect the relics under discussion in the correspondence, examine the mounds where they were discovered, interview the finders, and investigate all available evidence.

*December 26, 1885.*—ADJOURNED MEETING.

President C. E. Putnam in the chair; nineteen members present.

H. P. Royce elected to regular membership. Professor Erasmus Haworth, of Oskaloosa, Iowa, made corresponding member.

Notice was given of the death of Mr. Richard Smetham, a life member, who died November 27th, during a visit to England. Dr. C. C. Parry read a brief sketch of Mr. Smetham, which was ordered published in the city papers and placed upon the records of the Academy.

EARLY REMINISCENCES OF RICHARD SMETHAM.

BY C. C. PARRY.

A well-known form, that for forty years has been familiar to all on the streets of Davenport, has, for several months past, disappeared from public view; and now word comes across the broad Atlantic waves that Richard Smetham, so long a resident here, has taken that last journey "from whence no traveler returns."

Born in England, January 8th, 1819; emigrating to America in 1845; making Davenport his home from the spring of 1846 to the summer of 1885; returning for a first and last visit to his native land last August, and dying among relatives at Southport, England, November 25th, 1885. In these brief items are comprised the principal record of a life of nearly sixty-seven years, well known to every one present, but by few really appreciated or understood.

As one of the earliest personal acquaintances of the writer in Davenport since the autumn of 1846, and recognizing from the first, under a reserved exterior, unusual natural and acquired abilities, esteeming him highly for his worth's sake, and only regretting that my limited means

of information will not afford full scope for doing justice to his memory as a friend and an associate life-member of the Davenport Academy of Sciences, I cannot well decline this opportunity of placing on record a few personal recollections, which may be of interest to those here present, and not inappropriate to this time and place.

The natural reserve which, in later years, formed one of the marked traits of Mr. Smetham's social character, were less conspicuous at an early day in the history of this and other western towns, when everybody was expected to take an active part in all public and social relations, and peculiarities of disposition were merely looked upon as objects of inquisitive curiosity. But in Mr. Smetham's case, under this constitutional reserve lay a concealed depth of warm-hearted, generous sympathy, manifest only to his most intimate friends, tinged, it may be, with a slight vein of piquant misanthropy. My first introduction, in the character of family physician, afforded but a brief insight into the sacred relations of family life, which in this particular case were sedulously maintained, and guarded from outside intrusion for many years. The little, lowly cottage, with its picturesque site, crowning the hill overlooking the broad valley of the Mississippi, which he first selected for his western home, remained unchanged except in a thicker profusion of fragrant lilacs and blooming roses, while overtopped on every side by stately mansions of refinement and architectural elegance, located in part on his original purchase, and fairly represented his own unobtrusive character of only half-revealed attractions.

Only once that I can remember in the period of his active life (in 1848), Mr. Smetham undertook what in those days was an adventurous journey, on a raft, from the falls of the St. Croix to St. Louis, and, while speaking with enthusiasm of the natural beauties of this trip, he never seemed inclined to repeat its accompanying hardships.

Somewhere about this time (probably in the winter of 1848-9), the writer was associated with him in an organization called The Trans-Mississippi Club, the object of which was to keep up a friendly intercourse of members during life, by yearly meetings and personal records. This worthy object was, however, never carried out, and our first annual festival was also our last. According to my present recollection, but one member of this club, beside myself, is now living in Davenport.

As Mr. Smetham was known to possess a high order of literary ability, he was frequently urged—but always declined—to give any public exhibition of the same; only one little poetic gem, which I shall notice later on, thrown off from his ready pen, found place in print, in the pages of the *Weekly Gazette* in 1847.

As years passed on and other engagements called the writer to far distant scenes of labor, Mr. Smetham, instead of cultivating in public his higher abilities, assumed in turn the routine drudgery of a country editor, a post-office clerk, a deputy county treasurer, and finally a bank cashier. In all these unattractive positions the duties assigned him were always carried out with scrupulous exactness and unswerving fidelity. It was only as a side issue, and with a view to needed relaxation that he exercised his taste as an art connoisseur, and became an

active member and liberal patron of the Davenport Academy of Sciences. Beneath that earnest face as a frequent attendant at our regular meetings, lurked the hidden fire of a repressed, thoughtful zeal, which we would have been glad to see expressed in fitting words had we the magic power to evoke them; but it was not to be—like the hero of Gray's *Elegy*, which, in many other respects he resembled, he calmly chose

"Along the cool sequestered vale of life  
To keep the noiseless tenor of his way."

With ample means at his command, he apparently never ventured beyond his first land speculation, and postponed until too late in life the inspiration he might have received from a visit to his native land. Only after years had diminished his physical vigor, and tinged his locks with silver—after his invalid wife had been laid at rest beneath the prairie sod, did he undertake alone this long-postponed journey, leaving an only daughter behind, anxiously expecting news of his speedy recovery—instead of which comes the hasty summons to his death-bed; alas! not soon enough to receive his parting blessing. And now our friend and associate finds a peaceful grave in the land of his birth and early youth.

Let me now, as his old-time friend, do the best thing for his memory by bringing from its obscure hiding-place and putting on permanent record in the proceedings of this Academy, of which he was so long an honored member, the poetic gem before alluded to, entitled "*A Prairie Sunset*," an ode which in its keen appreciation of natural scenery, its graphic imagery, tender vein of pathos, and polished poetic diction, would be worthy the pen of a Gray or a Bryant.

It is introduced by the following characteristic note in the *Weekly Gazette* of February 22, 1847:

DAVENPORT, IOWA, February 11, 1847.

MR. EDITOR:

*Sir*—The enclosed verses were written last fall, and are offered to you for publication in the hope that they may claim from local interest the attention which they may fail to awaken on the score of poetic merit. I admit your right, as the priest of your own oracle, to print or refuse them, and I have only to beg that should you deem them unworthy of your paper, your stove alone may be the repository of the secret of their existence.

Yours, etc.,

R. S.

#### A PRAIRIE SUNSET IN AUTUMN.

Emblem of the Eternal! gorgeous sun,  
How vainly doth the laboring mind essay  
To laud thee worthily; since time begun,  
Supremely beauteous, thy transcendent ray  
Has glittered in the poet's verse, yet none  
Hath yet half told thy glory, King of Day!  
Till human praise can match angelic song,  
The Muses' highest flight will do thee wrong.

How grand thy course, and how august thy birth:  
 God said "Let there be light," and suddenly  
 Light followed the behest; the heavens, the earth,  
 The thronging universe, were full of thee;  
 Thy disc blazed luminous, and light went forth  
 With swift diffusion, over land and sea;  
 The morning stars sang rapturous at thy rise,  
 And dungeon darkness changed to Paradise.

This morn thy face through mists was faintly gleaming;  
 The hot meridian saw thee conquest-crowned.  
 'Tis eve. And now thine eye is softly beaming,  
 Throwing long shadows on the brodered ground,  
 And mellow floods of golden rays are streaming,  
 Bathing in joyous lustre all around;  
 Till by thy smile to this poor earth is given  
 A rich reflection of the hues of heaven.

The sky is crowded with magnificence  
 To grace and illustrate thy short adieu;  
 Deep orange is the horizon, from thence  
 Stretches a lengthened belt of saffron hue,  
 Bordered with streaks of violet intense,  
 Attenuating gently into blue:  
 While in the east a line of silver light  
 Proclaims the coming of the Queen of Night.

Far round the boundless prairie sinks and swells  
 With long, low rolls, like a subsiding sea  
 Which, by strong magic and most potent spells,  
 Congealed in all its waves, has ceased to be  
 A thing of ebbs and flows; these hills and dells,  
 Clothed with luxuriance, flourish steadfastly,  
 But at this hour the varying landscape seems  
 To borrow motion from thy shifting gleams.

The genial atmosphere is full of balm;  
 A Sabbath stillness reigns o'er hill and dale;  
 Save when the grouse with soft wings fans the calm,  
 Or with sharp whirrings springs the startled quail,  
 Or where yon small bird pipes his evening psalm;  
 The nearest house seems like a distant sail:  
 The bland air vibrates to no human tone,  
 With peace and solitude I am alone.

Yet not alone! the spirit hath a dower  
 Of dear remembrance, safe from time's attack,  
 A sacred treasury, and there is power  
 In the warm smile of Nature to call back,  
 Through the bright vistas of this sunset hour,  
 Those who have wandered with us o'er life's track,  
 Whose hearts are founts of purest sympathies,  
 And love right fondly such a scene as this.

They come in spirit from that distant shore,  
 The mother-land which late I called my home;  
 That sea-girt isle which I may see no more;  
 But 'tis a bliss to know, where'er I roam  
 That neither lapse of time, nor tempest's roar,  
 Nor constant washing of the salt sea foam,  
 Can sunder soul from soul, while they may still  
 Drink kindred draughts from Nature's gushing rill.

And now the broad red orb has sunk from sight;  
 The shadows deepen; in the glimmering skies  
 Lingers a faint and fast receding light;  
 A misty cloak o'er all the landscape lies;  
 The dew falls, shaken from the wings of night;  
 O'er the expiring day the fresh wind sighs;  
 And I will homeward turn, with thankful heart  
 That in Creation's joys I still may claim my part.

(Davenport, 1846).

R. S.

On motion, the following resolution was adopted:

*Resolved*, That a committee of five be appointed to act in consultation with the President of the Academy, to investigate the matter of the conduct of Mr. A. S. Tiffany, in impeaching the genuineness of certain very important relics in our museum, and in putting in circulation grave charges against the honor and good faith of his associate members, without having first presented his charges before the Academy.

The following were appointed as such committee: Messrs. H. C. Fulton, D. S. Sheldon, C. H. Preston, James Thompson, C. C. Parry.

#### *January 27, 1886.—ANNUAL MEETING.*

President C. E. Putnam in the chair; thirty members present.

Reports of the various officers were presented.

Reports as condensed for publication, as follows:

#### TREASURER'S REPORT.

Receipts from all sources.....	\$1,138 21
Disbursements .....	1,131 59
Balance in treasury.....	\$ 6 62
Floating Debt .....	\$ 108 70
Permanent Endowment Fund.....	\$1,156 95

W. H. FLUKE, *Treasurer*.

#### RECORDING SECRETARY'S REPORT.

Regular Academy Meetings.....	12
Number of Regular Members.....	170
Number of Life Members.....	80
Number of Corresponding Members.....	303
Visitors during the year (1885).....	2,273

The Rooms of the Academy have been occupied during the year by the Scott County Horticultural Society, the Scott County Medical and Pharmaceutical Societies, and the Agassiz Club.

LUCY M. PRATT, *Recording Secretary*.

## LIBRARIAN'S REPORT.

Additions to the Library during 1885.....3,196

DR JENNIE McCOWEN, *Librarian*.

## REPORT OF PUBLICATION COMMITTEE.

Receipts.....\$525 25

Expenditures ..... 590 60

Volume IV. nearly completed. Funds necessary for completion of the volume, \$300.

MRS. M. L. D. PUTNAM, *Chairman*.

## CURATOR'S REPORT.

The additions to the Museum for 1885 included a large number of archæological relics presented by Captain Hall, a small prehistoric vessel made of steatite from California; an earthen pipe, and another of red pipestone, both apparently Indian pipes, a stone relic inscribed with some very curious characters, all found in this vicinity; several historical relics, a few mineralogical specimens; mastodon bones and teeth; a Japanese book of thin sections of the Japanese woods—one hundred species and three sections of each; three live rattlesnakes; a collection of southern shells, including some new species; and other less important articles, too numerous to mention. The Academy needs a cabinet, illustrating our local geology as fully as possible, and also a systematic collection in geology and mineralogy, both properly classified for reference and study, as they would render valuable aid to members and young societies, and to classes who might visit them from the public schools.

W. H. PRATT, *Curator*.

## PRESIDENT'S ANNUAL ADDRESS.

By C. E. PUTNAM.

LADIES AND GENTLEMEN:

In the performance of the duty which devolves upon the President, it has been the almost uniform practice with those who have preceded me to embrace in the annual address a synopsis of the reports of the several officers of the Academy; but, as the condition and progress of the various departments are set forth in these reports, I shall upon this occasion depart from the usual custom, and omit any reference to these details.

When, at the last annual meeting of the Academy, I yielded to the urgent solicitation of its life members, and accepted the position I now hold, it was with many misgivings whether the absorbing cares of a professional life would afford me sufficient leisure to properly perform its duties. The delightful studies, the intricate researches, the profound and thoughtful discussions which make up the life of a scientific association, are so exacting in their requirements as to almost exclude the ordinary men of business, and limit its active

membership to the select students of science. But, learning that this fair structure, which embodies so many hopes, fears, struggles, which has been sanctified by sacrifice and ennobled by high ideals, was being assailed from without, and that a crisis had arrived in the history of the Academy when its friends and patrons must rally to its support, I could not refrain from taking my place in the ranks, and using my best endeavors to protect it from impending ruin.

At the close of the preceding year there had appeared in the Second Annual Report of the Bureau of Ethnology, connected with the Smithsonian institution, a virulent attack upon the authenticity of the inscribed tablets and elephant pipes in the museum of our Academy, and this was accompanied by a most unjustifiable assault upon the Rev. Mr. Gass, the principal discoverer. These charges against our Academy were made by Henry W. Henshaw, an employe in that department, and had the approval, and were published with the endorsement of, Major Powell, the Director of the Bureau. As the high position attained by the Academy in the world of science has been largely due to these important discoveries, it will be perceived that to permit this charge to go undefended would be not only an injustice to the discoverers, but destructive of its influence and usefulness. The gentleman making these accusations was not an archæologist, never inspected the relics in question, was never on the ground where they were found, was unacquainted with the discoverers, as also with the members of the Academy, never made an inquiry of either, and hence it should surprise no one that his publication was made up of blunders and falsehoods in about equal proportions. Still, as it appeared in a government publication, and thus was supported by official sanction, it was calculated, if uncontradicted, to do great injury. Early in the past year, therefore, a paper was prepared setting forth the facts in the case, and pointing out the errors in the published statement of Mr. Henshaw, and this vindication of the authenticity of our relics was printed in pamphlet form, and widely distributed. It was generally received with favor and approbation, as is evidenced by an extensive correspondence with eminent archæologists in this country and Europe. There should be nothing discouraging in this controversy to the members of the Academy. We all know Rev. Mr. Gass to be a worthy and true man, we all have entire faith in the genuineness of our relics, and, in the end, truth and justice will prevail. Indeed, this attack itself attests the great scientific value of these interesting relics. It discloses, too, the pregnant fact that, in the honorable strife for precedence in archæological research, we have outstripped our competitors, and hence this abortive attempt to detract from the value of our discoveries. It also makes it clear that at last the Academy has reached the age of manhood. In our infant days we were encouraged some, petted perhaps a little, occasionally, it may be, passed by with indifference; but now that our little planet has crossed the orbits of these official luminaries, we are the recipients of sturdy blows, which indicate that we are at last recognized as among the stalwarts in the scientific world. I therefore congratulate you, ladies and gentlemen, that we have at last attained to

the age of persecution, and can now claim for our Academy the crown of martyrdom.

The Davenport Academy has sprung into being, as it were, in a night, and seems almost like some fantastic fairy structure. Yet here it stands, real, substantial, a goodly edifice, with possessions gathered from the earth and the seas—a vast treasure-house of scientific riches. The publications of our Academy are in all the public libraries of the world, and in exchange we have regularly placed on our tables the publications of other scientific societies, in every tongue and from all civilized lands. It is undoubtedly true that our little Academy is now recognized as among the few successful organizations in our country. Yet it has had no capital, no endowment, no income. It relied only on faith, hope, persistence, but these have never failed it. It had only to express a need, and it was provided for; only to proffer a request, and a whole community, as it were, rose up to grant it. What means this wonderful success? Simply this: Our Academy belongs to the city; it represents the best thought, the highest aspirations of its citizens. Their wealth is its capital, their generosity its endowment, their thoughtful care its income. Why, look you, ladies and gentlemen, only a year or two since, the attention of the friends and patrons of the Academy was called to a burdensome debt hanging over it, and immediately our citizens crowded to the rescue. A few prominent and influential men directed the movement, spoke only a few earnest, well-directed words, and the debt disappeared like the mists of the morning. So, too, early in the past year, funds were needed to meet some small current obligations, and immediately there was conceived in the teeming brains of some of our members a "Carnival of All Nations." The entire community entered with zeal and energy into the realization of this happy thought, and the result was a magnificent representation, which makes almost an epoch in the history of our city. It brought amusement and instruction to its participants, and a considerable increase of resources to the Academy. Thus it is our Society is buoyed up, and carried onward by the necromancy of success.

In this connection it may be well to add a few words of explanation concerning the Endowment Fund. Of the amount raised at the citizens' meeting a few years since, the surplus of about eight hundred dollars remaining after the payment of the debts of the Academy, increased during the past year to the sum of one thousand dollars through the legacy of the late Robert McIntosh, has been securely invested in a farm mortgage, bearing eight *per centum* interest, and this is now the nucleus of our Endowment Fund. Belonging to this fund there still remains a small balance which will be invested in like manner as soon as the amount is sufficiently large to make it practicable. It is with societies as with individuals, when they live within their incomes and begin to save, their success is assured. During the past year an opportunity was afforded the Academy to purchase four feet of ground adjoining its building on the north, and, as it was essential for both light and ventilation, the proposition was accepted. The note of the Academy for three hundred twenty dollars, the price of the same, is

now outstanding, and early provision should be made for its payment.

The Constitution of our Academy provides for a permanent Publication Fund, the income of which should only be used to carry on the publication. Quite recently, Mr. Charles Viele, of Evansville, Indiana, contributed the sum of fifty dollars as the commencement of this fund, which entitles the donor to receive all the publications of the Academy issued thereafter for life. Building on this corner-stone so auspiciously laid, we shall confidently expect in the near future to have this fund well established by other generous contributions. The value of the regular publication of our proceedings cannot be overestimated. It incites to original research, and through exchanges keeps us acquainted with the most recent investigations and discoveries throughout the scientific world. But for the information thus acquired we might be groping at the solution of problems already solved by other investigators. Undoubtedly the high standing of our Academy at this time is in large part due to its enterprise in thus publishing to the world its great discoveries. During the year, through the indefatigable exertions of the Publication Committee, the printing of Volume IV. of our Proceedings has been successfully accomplished, and the volume will soon be ready for distribution. It is a gratification to be able to state that this work has been carried on without imposing financial burdens upon the Academy, and that in point of scientific interest it will compare favorably with preceding volumes.

In the early autumn it was decided, with the beginning of the new year, to throw open the Museum and Library of the Academy to the public, free of charge for admission. Accordingly, on January 1st, the door-keeper was withdrawn, and now any citizen of Davenport, or any stranger visiting the city, is entitled to freely inspect its museum and consult its library. As this institution has been built up by the voluntary contributions of citizens, it seemed only right and proper that all should have free access to its building, and an equal share in its privileges. Visitors hereafter will only be required to conform to certain rules and regulations essential to the preservation of its valuable collections.

It was also wisely decided, some time since, to open the Academy building during certain hours on the Sabbath day. It is well known that there are large numbers among our business men, as well as among the artisan and laboring classes, whose only leisure is on this day; and hence, but for this beneficent arrangement, they would be debarred from its privileges. It is considered that this new policy will subserve a wise and good purpose. The great book of Nature, which is here opened for study, cannot be otherwise than purifying and ennobling in the formation of character, and the educating influences thus exerted are as far-reaching as they are beneficent. I know of no instrumentality so effective to counteract the dissipation and frivolity which too often and with too many rule this day. Those mistake who think that our scientific workers are alone found among the wealthy or the highly educated. Many an artisan, as he passes along to his daily task, is pondering some of the deep problems of science, and not infrequently

the hard hand of toil is accompanied with the thoughtful brow of the student. The masters of the future in science, as in politics, will come from the ranks of industry, and therefore it is a wise provision which affords to this class such excellent opportunities for improvement.

The fact must not be overlooked that institutions like this Academy take high rank in the scheme of public education. In them the student is brought face to face with Nature—the great storehouse of all knowledge. Here are learned lessons of close observation and careful research, and out of the habits of mind thus formed have come the great discoveries and inventions which distinguish our modern civilization. It seems almost impossible to exaggerate the beneficent influences which result from the study of science. Instead of passing the best years of life mastering the “dead languages,” which, when acquired, can be of little practical value, those engaged in scientific research learn the great truths of creation, and master the utilities of life. The discoveries of steam and electricity, for example, and the inventions by which these mighty elements have been subjected to human use, are among the direct results of the studies encouraged by such institutions, and it is these things which make up the superiority of modern over ancient civilization.

It is undoubtedly true that the ranks of our members engaged in original research have been somewhat thinned by death and removal, and this fact has been the occasion of some solicitude concerning the future of our Academy. We, however, need entertain no fear, for the workers are near at hand. There has recently been noticed among the youth of the land a great scientific uprising, which is destined to rank as one of the epochs of history. In 1880 an Agassiz Association was formed through the instrumentality of Harlan H. Ballard, of Lenox, Mass., having for its object the study of natural history among young persons. There are now over nine hundred separate chapters in this and other countries, with over 10,000 members. The institution has an excellent organization. Each chapter must have not less than four members, and may elect its own officers, adopt its own rules and pursue whatever course of study is deemed desirable. The first great convention of the Agassiz Association was held at Philadelphia, in 1884, and it is in contemplation to hold the next national gathering in Davenport during the coming summer. There are two Davenport chapters of this association, one containing thirty-two members, consisting mainly of high school scholars, and the other about forty members, derived from the grammar schools. Both chapters hold weekly meetings in the Academy building. We thus have our scientific successors close at hand, and therefore need have no fear but that our work will be taken up and carried onward to a still more splendid success.

It should be noted in this review that during the past year we have been favored with visits from Dr. Willes De Hass, of Washington, D. C., and Rev. J. P. MacLean, of Hamilton, Ohio. Both these distinguished archaeologists, while in Davenport, delivered lectures gratuitously, for the benefit of the Academy. Dr. De Hass, it will be remembered, was the gentleman who took the famous Grave Creek tablet to Washington,

and placed before the world the facts of its discovery, and Rev. Mr. MacLean, in his "Mound Builders," has, perhaps, advanced the strongest arguments yet presented tending to establish the authenticity of that interesting relic. There are thus no more competent archæologists in the country, and both these gentlemen, after a careful examination of our Elephant Pipes, and inquiry into the history of their discovery, expressed entire confidence in their authenticity.

During the past year we have been called to mourn the loss of Mr. Richard Smetham, one of our life members. While this kindly and genial gentleman did not personally engage in scientific research, he had an intelligent appreciation of its value, was a frequent visitor to our rooms, and took a lively interest in the welfare of the Academy. A gentleman of delicate sensibilities, generous culture, and fine abilities, his loss leaves a vacancy in the ranks of our life members not easily filled. Our associate, Dr. C. C. Parry, has already made the death of Mr. Smetham the subject of a most appropriate obituary notice, which appears in our published proceedings.

Before closing this review, it is fitting we should recall the fact that it is a principal object of an association like our own to advance the frontiers of human knowledge, and it will be well, therefore, for us to pause, take a backward glance over our career, and ascertain what contributions we have made to the great storehouse of facts. Man is placed here on earth surrounded by mystery, and it is only here and there some adventurous explorer penetrates this vast unknown, and brings to light some new fact of creation. Thus, the duration of man's existence on earth has long been the subject of extensive research and profound speculation. In the special field of archæology this Academy has accomplished important results. Our pottery, our cloth-covered copper axes, our inscribed tablets, our elephant pipes, are absolutely unique, and unequalled in any other collection in the world. They carry back the age of man into the far distant past, when the gigantic mammoth frequented our prairies, while yet the glaciers were at work preparing a home for civilization. And when the history of these wonderful relics shall be written, it will not fail to record the adventurous voyages of the "Old Man in the Skiff," Capt. Wilfred P. Hall, which have enriched our museum with all this rare old pottery; it will take note, too, of the disinterested and indefatigable labors of Rev. J. Gass, in his ceaseless delving in mound and earthwork until he brought forth, and freely placed in the museum of the Academy, relics from the far past so rare they open a new page in human history; nor will the historian fail to take count of the intelligent observation, the exact knowledge, and the tireless labors of our Curator, Prof. W. H. Pratt, in bringing order and symmetry out of all this mass of material, and thus making possible its scientific study. So, too, in another line of research, our associate, Prof. W. H. Barris, has penetrated into the bowels of the earth, and read so truthfully the story of the rocks that they must bear his name to distant generations. And who does not know that the name of Dr. C. C. Parry has been stamped upon the mountain peak, and traced in lines of beauty on many a mountain

flower. And may I not add, that whomsoever in future years shall seek to study the *Solpugidae*, must needs come back to the early labors, the exact researches of that young entomologist who gave this study his parting breath, his last thought on earth. True it is, the man who adds a new fact to the sum of human knowledge is entitled to a place among the immortals; and it may be our citizens have builded better than they knew, and that this foster-child of their bounty will not only carry the name and fame of their fair city into other lands, but will perpetuate it to distant ages.

It only remains for me to call your attention to the fact that at no distant day it will be found necessary to complete the present building. It is already needed. The museum is now crowded to overflowing. For want of shelf-room, it is found impossible to properly arrange and classify all the specimens in our collection. The books and pamphlets, too, which have come to the Academy without cost, now crowd its shelves to repletion. The generous citizens of Davenport must finish their good work, and give us more room in the near future. To accomplish this only requires concert of action. Where many coöperate, the individual burden is light. The anticipation of this completed building has been in the thoughts of earnest workers of the Academy these many years. In this world of ours the ideal precedes the real, and slowly but surely faith works out its problems. The completed building will, therefore, soon be erected, and when that happy hour arrives and our citizens throng its corridors to witness the spectacles it presents, methinks, to the eye of faith, the curtains that separate us from infinity should be put aside, and we be permitted to behold, standing on that other shore, an old man and a youth, with the once closed ear now attuned to the music of the spheres, and the wonted wan cheek now all aglow with the bloom of the celestial hills; and to the ear of faith there should come sounding across the abyss their glad acclaim: "It is finished! It is finished!"

#### ELECTION OF OFFICERS.

*President*—C. E. PUTNAM.

*First Vice-President*—C. E. HARRISON.

*Second Vice-President*—J. B. PHELPS.

*Treasurer*—Major G. P. McCLELLAND.

*Recording Secretary*—Dr. JENNIE McCOWEN.

*Corresponding Secretary*—W. H. PRATT.

*Librarian*—H. A. PILSBRY.

*Curator*—W. H. PRATT.

*Trustees*—1st, Dr. PRESTON; 2d, JAMES THOMPSON; 3d, E. P. LYNCH; 4th, H. C. FULTON.

*January 29, 1886.*—REGULAR MEETING.

President C. E. Putnam in the chair; fifteen members present.

## STANDING COMMITTEES

were announced, as follows:

*Finance.*—G. P. McClelland, E. P. Lynch, J. B. Phelps.

*Publication.*—Mrs. M. L. D. Putnam, Dr. C. C. Parry, Prof. W. H. Barris, Dr. C. H. Preston. James Thompson.

*Library.*—H. A. Pilsbry, C. E. Harrison, H. C. Fulton.

*Museum.*—W. H. Pratt, H. A. Pilsbry, Prof. D. S. Sheldon, Prof. W. H. Barris, William Riepe.

Mr. Harrison called attention to the locality of the Signal Service thermometers as objectionable, occupying the center of a flat tin roof on a building heated by steam, with the surrounding chimney-tops sending up volumes of heated air. A discussion on the subject ensued.

*January 29, 1886.*—TRUSTEES' MEETING.

President C. E. Putnam in the chair; eight members present.

*Voted,* To keep the museum open from 10 to 12 A. M., from 2 to 4 P. M., and on Sundays, from 2 to 4 P. M.

*Voted,* To continue salary of Curator at \$500 per annum.

The following resolution was unanimously adopted:

*Resolved,* That in view of the crowded state of the museum, it is not considered advisable for the Academy to longer continue the custodian of private collections, and that the Secretary is hereby instructed to notify the owners of such collections that they are requested either to donate them to the Academy or to remove them from the building.

*Voted,* To grant the request of the Agassiz Chapters for the use of rooms in the basement.

*Voted,* To grant the use of the Academy to Mrs. Putnam, for the usual entertainment for children, on the 22d of February.

*February 12, 1886.*—SPECIAL MEETING.

Vice-President C. E. Harrison in the chair; six members present.

Committee on Programme reported as follows:

That at each meeting, a topic of discussion be announced in advance for the next meeting.

That a paper on that subject be secured, if possible; if not, that selections be read from the current literature accessible, followed by discussion or conversation germane to the subject.

That we confine ourselves chiefly to subjects in Natural Science, and that we suggest as suitable topics the following: "The Coal Measures

of Iowa, including the Building Stone of Iowa, including mention of Gypsum, Sand, Clay, and the Ochre from which Mineral Paint is made; Mathematics of Plants; Migration of Plants; Protective Mimicry of Animals; Protective Colors of Animals; Origin of Our Domestic Animals; Migration of Birds; Aerial Navigation; Explosives; Glycerine; Gutta Serena; Phosphorescence; Petroleum, its Manufacture and Uses; Electricity as a Motive Power; Meteoric Stones; Pottery."

Report adopted, and voted that this list, to which any subject proposed and approved at any meeting may be added, be kept by the Secretary, accessible to members.

A discussion then ensued on "Railroad Telegraphy." The subject of "Electric Motors for Street Cars" was also discussed.

*February 26, 1886.*—REGULAR MEETING.

President C. E. Putnam in the chair; twenty-two members present.

Curator reported the receipt of three boxes of pottery from ancient mounds.

Mrs. Putnam reported the proceeds of the entertainment on the 22d of February, \$42.00.

Dr. Barris read a review of a pamphlet on the "Geology of Scott County, Iowa, and Rock Island County, Illinois," by A. S. Tiffany, which was referred to the Publication Committee.

Prof. R. E. Call read by title, and gave a synopsis of a paper on "New Fresh Water Mollusks."

H. A. Pilsbry and R. E. Call offered a paper on "Pyrgulopsis," a new genus of mollusk, with descriptions of two new species. Both papers were referred to the Publication Committee.

Prof. Call, as a new member, greeted the Academy, and congratulated the members on the value of its work and the worth of the appreciation it is receiving from all parts of the world.

*March 18, 1886.*—TRUSTEES' MEETING.

President C. E. Putnam in the chair; eleven members present.

On motion, the Finance Committee was authorized to make a temporary loan of \$100, to pay the balance due for completion and distribution of Volume IV. of the Proceedings.

On motion, the Publication Committee was authorized to proceed with the publication of Volume V.

Mr. Putnam read a communication signed by himself and Mrs. Putnam, in regard to the entomological collection of their son, the late

J. Duncan Putnam, which had been on deposit in the Academy since 1877, and asked the appointment of a committee, with whom to confer in arranging the terms to be attached to the proposed donation.

The following committee was appointed: Dr. C. C. Parry, Prof. Herbert Osborn, W. H. Pratt.

*March 26, 1886.*—REGULAR MEETING.

Vice-President J. B. Phelps presiding; twenty-eight members present.

Publication Committee presented bound copy of Volume IV. of the Proceedings, with brief statement of contents. Reported an extra issue of five hundred copies, necessary to supply the demand, growing each year, for our exchange list; also, an increase in the number of pages over any previous volume. Arrangements are already perfected for commencing Volume V., four papers of scientific value now in the hands of the Committee.

Mrs. M. L. Marks was elected a regular member; D. S. Harris, of Cuba, Illinois, elected to corresponding membership.

The special committee to investigate the conduct of Mr. A. S. Tiffany, under resolution of December 26, 1885, would respectfully report that it has carefully investigated the matter set forth in the foregoing resolution, and finds:

That Mr. A. S. Tiffany has impeached the genuineness of the so-called "limestone tablet" and "elephant pipes," by declaring by parole to a number of persons, and by declaring in a letter written by him to Prof. P. W. Norris, under date of October 27, 1882, which letter was given by said Prof. Norris to Prof. Cyrus Thomas, that said relics were frauds; all of which was done by Mr. Tiffany without having ever presented to the Academy any charges against the genuineness of said relics.

That in said letter, and also by parole, Mr. Tiffany has charged our associate, Mr. C. E. Harrison, with being a party to the alleged fraud, in having manufactured said "limestone tablet," and has made said charges without having ever presented the same to the Academy for investigation.

That Mr. A. S. Tiffany was before your committee, in person and by attorney. That he admitted having written said letter to Prof. Norris, but denied that he had made the charge orally, although it was in evidence that he had so done to several persons, and to at least one member of your committee. He also stated to your committee that he believed Mr. C. E. Harrison to be guilty of the fraud, as charged by him, and that he could prove his belief to be true; but refused to present any proof, or attempt the same, or to inform your committee why he held such belief, and gave as his reason for the refusal that he understood Mr. Harrison had threatened to bring a civil action against him

for damages arising out of the charges made, and that he considered the evidences of the alleged fraud matters to be used in defense against such an action, and that to put Mr. Harrison in possession of the same would give him an unfair advantage in the event of the threatened litigation. Mr. Tiffany further admitted that he had never presented to the Academy any charges against the genuineness of said relics, the genuineness of their finding, or against the honesty and good faith of Mr. Harrison in regard to the same.

Your committee has not deemed it within its province—under the foregoing resolution—to inquire into the genuineness of said relics, except as far as it might be necessary, in the event of evidence of fraud being offered. But no evidence has been offered that might, in any way, lead to the Academy changing its present position in regard to these relics; or to sustain any charges made by Mr. Tiffany. Neither is there any reason, known to your committee, for doubting the entire correctness of the statements made at the time of finding, or since, by the gentlemen concerned in the discovery of the relics.

In conclusion, your committee recommends that Mr. Tiffany—who, by his own acknowledgment, has been guilty of acts, as above mentioned, which are clearly unjust, and especially to be condemned in a member of a scientific association—be subjected to the penalty of expulsion from the regular membership of the Academy.

Dated March 26, 1886.

Signed, H. C. FULTON.  
C. H. PRESTON.  
JAMES THOMPSON.  
C. C. PARRY.  
D. S. SHELDON.

On motion, the report was accepted and placed on file, and committee discharged.

The following resolution was then offered and passed—yeas, 25; nays, 2:

WHEREAS, The special committee appointed by the Academy on December 26, last, to investigate the matter of the conduct of Mr. A. S. Tiffany, in making and putting in circulation grave charges against the honor and good faith of his associate members, having reported that, after a careful investigation, it finds Mr. Tiffany, by his own acknowledgments, guilty of the charges made by the resolution, and that he still claims his charges to be true, but refuses to attempt to present any proof of the same; and

WHEREAS, The committee recommends that Mr. Tiffany be subjected to the penalty of expulsion from the regular membership of the Academy; and

WHEREAS, We believe the action recommended by the committee to be just, under the circumstances; that vindication against unproven charges is due to the gentlemen instrumental in the discovery of the relics charged to be frauds; that the Academy owes to itself the duty of protection against internal dissension, to the end that its energies may be directed to the purposes of its organization, and not to be wasted on controversies instituted without apparent

foundation, and encouraged by other than honest scientific motives; and further, believing that it would be unjust to require those whose honor and good faith are brought in question by the charges of Mr. Tiffany, to work in the Academy and attend its meetings with him; therefore

*Be it Resolved*, That Mr. A. S. Tiffany be, and hereby is, expelled from the regular membership of the Academy.

In view of statements made by Dr. C. T. Lindley, in his speech in defense of Mr. Tiffany, the following motion was offered:

*Moved*, That a committee, consisting of Messrs. G. P. McClelland, Rev. Dr. Barris, Prof. D. S. Sheldon, and J. B. Phelps, be appointed, to investigate the matter of certain defamatory charges against members of the Academy, made by Dr. C. T. Lindley.

Dr. Lindley desired to have G. W. French on the committee, and his name was accepted by the mover and added thereto.

The motion was unanimously adopted.

*April 29, 1886.*—TRUSTEES' MEETING.

President C. E. Putnam in the chair; nine members present.

*Voted*, That the Finance Committee be authorized to borrow a sum not to exceed two hundred and fifty dollars (\$250), to pay indebtedness of the Academy not otherwise provided for.

*Voted*, To grant request of Agassiz Chapter to hold their Agassiz birthday anniversary meeting in the Academy.

*April 30, 1886.*—REGULAR MEETING.

President C. E. Putnam in the chair; thirty-two members present.

Mrs. M. L. Marks placed on the list of life members; F. M. Witter, of Muscatine, Iowa, elected a corresponding member.

The special committee, to whom was referred the investigation of the charges made by Dr. Lindley against members of the Academy, reported as follows:

Dr. Lindley charges, (1) That curved base pipes have been made in the Academy; (2) That people about town know it; (3) That Mr. Pratt knows all about it; (4) He (Lindley) not only knew that they were made, but had seen them made; (5) Mr. Tiffany had good reasons for his conduct, he knew the tablets were frauds, and that other frauds were committed; (6) He is not alone in this belief; it is shared by some of the most respected members of the Academy; (7) Mr. Harrison has made fraudulent tablets, and passed them off as genuine; (8) Mr. Pratt is dishonest in that if he should pack his (Lindley's) collection, he would drop out and leave behind the most valuable specimens; (9) The Committee on Tiffany's conduct did not want to reach the facts in the case, and were neither just nor fair in their action; (10) There are "goings on" at the Academy which he is going to throw light

upon. He is going to see that every scientist in Europe hears of these things, and every time they are smoothed over he is going to "boom it up again."

Your committee beg to report that, after a full examination, they find the charges made by Dr. Lindley not sustained. Lindley denied having uttered No. 7.

Signed, G. P. McCLELLAND.  
W. H. BARRIS.  
J. B. PHELPS.  
G. WATSON FRENCH.

Prof. Sheldon was unable to serve, owing to illness.

On motion, the report was received and the committee discharged.

*May 28, 1886.*—REGULAR MEETING.

President C. E. Putnam in the chair; thirty-seven members present.

On motion, the report of the investigation committee in the case of Dr. Lindley, was adopted.

Prof. D. S. Sheldon offered the following resolution :

WHEREAS, Dr. Clarence T. Lindley has repeatedly assailed the integrity of this Association and certain of its members, and has finally formulated and presented before the Academy certain defamatory charges, which, on a judicial investigation by a committee consisting of G. P. McClelland, Rev. W. H. Barris, G. Watson French, and J. B. Phelps, were proved to be wholly unfounded; and

WHEREAS, The said Lindley has openly proclaimed his hostility to the Academy, and threatened to persist in his efforts to disturb its harmony and peace, and had thus violated his plain obligations as a member; and

WHEREAS, The longer retention of said Lindley as an associate would tend to impair the usefulness, and subvert the objects of this Association and injure its standing in this community, and discredit it among similar societies elsewhere; therefore

*Be it Resolved*, That Dr. Clarence T. Lindley be forthwith expelled from membership in the Davenport Academy of Natural Sciences, and that the Secretary be instructed to strike his name from the roll.

Dr. Lindley being present, and declining to withdraw during the discussion, on motion of Dr. Parry he was permitted to remain, if he desired to do so, and the yeas and nays on the motion to expel were called for in his presence, with the following result: Yeas, 36; nays, none.

Mr. H. G. Sharfenburg and John J. Dahms were elected to regular membership, and the following corresponding members were elected: Dr. S. F. Landry, Galveston, Indiana, Mr. Frank Leveritt, Denmark, Iowa, Pietro Bernabo Silorato, Rome, Italy.

A paper contributed by Mr. C. S. Watkins, on "Volcanoes in the Sandwich Islands," was read by Mr. Pratt, and referred to the Publication Committee.

*May 28, 1886.*—TRUSTEES' MEETING.

President C. E. Putnam in the chair; eleven members present.

Mrs. M. A. Sanders, in consideration of valuable donations, was made a life member, and the usual fee was remitted.

The President, the Secretary, and Dr. Preston were elected a committee to revise the by-laws.

*June 5, 1886.*—SPECIAL MEETING.

A special meeting of the Academy was called, on account of the death of Professor Sheldon.

Vice-President C. E. Harrison in the chair; eleven members present.

After remarks, Messrs. W. H. Pratt, W. H. Barris, and C. C. Parry were elected a committee to draft appropriate resolutions.

The trustees and members of the Academy were requested to meet at the Academy building, to attend in a body such services as may be held on the day of the funeral.

Adjourned until June 11, to hear the report of the Committee.

*June 11, 1886.*—MEMORIAL MEETING

in honor of Prof. David S. Sheldon.

President C. E. Putnam in the chair; thirteen members present.

The following resolutions were unanimously adopted:

WHEREAS, Our dearly loved associate and friend, Prof. David S. Sheldon, at a ripe old age, but in the midst of an active usefulness, has finished his work here, and entered upon the rest pertaining to the higher life,

*Resolved*, That in his departure, the Academy of Natural Sciences has lost a most efficient co-worker in the cause of science, and for the interests of the Institution, of which he was one of the founders, the first president, and always a zealous and active member.

*Resolved*, That we who remain will always bear in mind his accustomed kind and cordial greeting, and his cheerful aid and encouragement in all our plans. Naturalists and lovers of true science have long recognized in him the devoted student and the experienced teacher. Admirers of a true and noble life will mourn the removal of one of the brightest examples of such a life. Of him it may be most truly said: "The world is the better that he has lived in it."

*Resolved*, That in his death the cause of education loses one of the ablest and wisest workers; a teacher of teachers, whose pupils now scattered through this and foreign lands, ever turn to his memory with love and reverence.

*Resolved*, That we hereby express our deep sympathy with the relatives and connections, in the loss of such a loved member of the family circle.

*Resolved*, That these resolutions be entered upon the records of the Academy, and that copies be furnished for publication and for the daily papers.

Mrs. Putnam, on behalf of the Publication Committee, bore testimony to the great loss they had sustained in the death of one who had, from the first, given the enterprise his warmest support.

Remarks were also made by Dr. Parry, H. C. Fulton, Hon. George H. French, Mr. Pratt, and W. H. Holmes.

The biographical sketch of Prof. D. S. Sheldon, presented by Dr. C. C. Parry (since included in Vol. V., pp. 179-84) was referred to the Publication Committee.

*June 25, 1886.*—REGULAR MEETING.

President C. E. Putnam in the chair; six members present.

Curator reported a number of donations to the museum, among which were a cast of the "Waverly Tablet," from Prof. J. P. MacLean, of Hamilton, Ohio, and a collection of fossils from Prof. W. H. Barris, including the type specimens of crinoids figured in his papers published in the Academy proceedings.

Mr. Harrison desired to present his collection of several hundred natural history, geological and archaeological specimens unconditionally to the Academy. This offer was accepted with a special vote of thanks.

In pursuance of action taken by the Academy and communication presented by Mr. and Mrs. Putnam, at a former meeting, regarding the presentation of the entomological collection, cabinets and library of the late J. Duncan Putnam, Dr. C. C. Parry, chairman of committee then appointed, presented the report of said committee, specifying certain conditions under which it would be proper that such presentation should be made and accepted by the Academy, viz.:

CONDITIONS

under which the J. D. Putnam Entomological collection is to be donated to the Davenport Academy of Natural Sciences.

1. The Academy to assume proper care of the collection, by having it examined at least once a year by a competent entomologist.
2. The accompanying cases and drawers not to be used for additional collections to the exclusion of original specimens, except to introduce more complete material, or more fully illustrate original species; badly injured or mutilated original specimens to be preserved in best possible shape, unless duplicated by two or more perfect specimens. Type-specimens of original description to be very carefully preserved, and conspicuously so marked.

3. All labels of locality, date, name, etc., to remain on the pins as originally placed, and any additional labeling or change of name to be placed on separate slips below the original.

4. No specimens or books to be taken from the building without the written consent of the Academy Trustees or the donors.

5. Accompanying entomological books to be plainly marked as the Putnam donation, and all unbound pamphlets not to be placed on the shelves for general use until bound by the Academy.

6. Failure to comply with said conditions to annul the donation; or, on the dissolution of the Academy or diversion to other than scientific objects, the donation to revert to the donors or legal heirs.

7. Academy to ratify these conditions by formal resolution, an official copy of which to be furnished to the donors.

Signed, C. C. PARRY.  
HERBERT OSBORN (by letter).  
W. H. PRATT.

The committee then presented the following resolutions of acceptance of the generous proposition :

*Resolved, First,* That the Davenport Academy of Sciences hereby formally accepts, under the conditions recommended by the report of a special committee herewith received and endorsed by the donors, viz.: The entomological collection, with accompanying cases and books, of the late J. Duncan Putnam, heretofore deposited in the rooms of the Academy.

*Second,* That in thus gratefully accepting this munificent gift, the Academy also desires to place on record its appreciation of the noble character of unselfish devotion to scientific objects which was so worthily displayed in the life and labors of our late associate, the gifted founder of the collection.

*Third,* We also desire, on this occasion, to express our high regard for that exhibition of parental encouragement and liberality which has proved an essential factor in bringing out such valuable results which, by this gift, are incorporated for all time in this institution, of which the virtual donor, J. Duncan Putnam, was an efficient co-worker and liberal patron, and an illustrious example worthy of our earnest imitation.

*Fourth,* That a copy of these resolutions be conspicuously displayed in connection with the collections herein referred to, and the original papers referring to this matter be placed on file in the archives of the Academy.

In moving the adoption of the report, Dr. C. C. Parry addressed the Academy, as follows:

It is quite unnecessary to state before those here present that the donation now made to this Academy, of the J. Duncan Putnam entomological collection and library, represents no ordinary gift. Aside from its actual pecuniary value, which I have reason to know is not small, it is also important in inaugurating a policy that this Academy will hereafter require a full control of all the collections placed within its custody, and for which it is, in a measure, responsible. While I do not under-

stand it to rigidly exclude special deposits for temporary use or convenience for special studies, it does mean that no private collection, over which it has no control, can be accumulated in its limited space to the virtual exclusion of its own undisplayed material. This is so manifestly just that I do not see how any exceptions can be made to it.

When, several years ago, I was specially invited to deposit my botanical collections in a room of the Academy ostensibly designed for that purpose, in accepting, at the time, the courtesy offered, I clearly saw that if the collection, as I hoped and expected, would grow under my hand, its proper care and arrangement would require more room and attention than could be reasonably devoted to it in an institution including other and more popular branches of science. I therefore, at the proper time, quietly withdrew my collection from its temporary custody.

Since then, as is plainly to be seen, the Academy collections have largely outgrown the available room for their accessible arrangement and display. The library shelves are loaded down with unbound volumes that are virtually sealed books, and the damp, dimly-lighted basement is in request for storage or limited display of desirable collections. Of course, the first natural suggestion under such circumstances would be, why not appeal to the public, who are directly interested, for an addition to this building, properly to accommodate its constantly enlarging material for study or display. Let those who have heretofore "in the heat and burden of the day" carried this load of popular solicitation answer this suggestion. It would probably come in the form of "*Try it yourself.*"

Till our Davenport Peabody or Lick makes his appearance, we must be content to do the best we can with limited means, and the first exercise of economy will be to cut off outside expenses; hence, properly arises the policy of declining the custody of private collections.

That such a policy should immediately result in such valuable donations to our collections, as that now under consideration, could hardly be expected; but that it will eventually lead to such results is reasonable, from the fact that actual ownership implies special care and protection, and hence affords the best guarantee of an appreciative use of such donations.

But, to come back to the point that first started these suggestions: We have now placed in our hands the ownership, under reasonable conditions, of a most instructive and valuable collection of entomological material—historically interesting in its direct association with one who derived his earliest inspiration toward such pursuits in our associated membership; scientifically valuable in its profoundly thorough investigation and copious illustration—above all, memorable as a noble example to all of unselfish devotion to pure scientific pursuits. As such, let us gracefully accept it.

The report was adopted unanimously. Accompanying, were the written conditions under which the Academy becomes owner of the collection and books, signed by Mr. and Mrs. Putnam, as accepted.

A paper by W. A. Chapman, of Okolona, Arkansas, entitled "An Ancient Mine in Arkansas," was read and referred to the Publication Committee.

J. E. Lindsey elected to regular membership.

*July 9, 1886.*—ADJOURNED MEETING.

Vice-President C. E. Harrison in the chair; eleven members and one visitor present.

Dr. Parry presented a paper on "Harfordia; A New Genus of *Eriogoneæ* from Lower California." Received and referred to Publication Committee.

Mr. Fawcett, of the British Museum, being present, was introduced by Dr. Parry and invited to participate in the deliberations of the evening. Mr. Fawcett expressed great pleasure in being able to attend a meeting of the Davenport Academy of Natural Sciences, and especially in hearing the paper of Dr. Parry, which he regarded as a very valuable contribution to botanical knowledge. He then proceeded to give, in response to inquiry, a very interesting sketch of the British Museum—its origin, gradual growth, present dimensions, character of buildings, management, means of support, etc. Mentioned that one special feature of the management was the fostering of special collections in local societies, great attention being given to illustrating local flora and fauna and local archaeology; also to forestry. Attention had been forced to the latter by the great destruction of forests and consequent change of climate in some parts of the British Empire, notably in India, where the Forest Department is very strict and requires that wherever a tree is cut down another shall be planted in its place.

Mr. Pratt then read a paper on "Aerial Navigation," which was followed by a general discussion.

*August 10, 1886.*—TRUSTEES' MEETING.

President C. E. Putnam in the chair; eight members present.

Mr. Pratt called the attention of the Trustees to the desirability of prosecuting more actively the work of mound exploration, and, after considerable discussion as to ways and means, a resolution was adopted providing for the appointment of a committee of three to solicit subscriptions for the work. Messrs. G. P. McClelland, E. P. Lynch, and James Thompson were appointed such committee.

On motion, the Treasurer was instructed to reimburse the Curator for expenses connected with his trip to the Marshalltown bed of Crinoids.

A letter was read from Dr. P. J. Farnsworth, of Clinton, Iowa, in regard to mounds of Albany and Fulton, Illinois.

The following bills were allowed and ordered paid: Repairing roof, \$15.50; trays, etc., \$3.00; postage, \$75.00.

*July 30, 1886.*—REGULAR MEETING.

President C. E. Putnam in the chair; twelve members and a number of visitors present.

Curator reported some very valuable additions to the museum, the most notable of which was a collection of sixty-three species of fossils from the Paris basin, by Prof. Barris; and a number of exceedingly beautiful specimens secured by himself on a recent trip to the crinoid beds of Marshalltown.

Prof. Hatch reported a trip to the Ozark Mountains, and collections in botany and zoölogy.

S. M. Tracy, Professor of Botany in the University of Missouri, being present, was called upon, and made a few remarks in a very pleasant and complimentary strain, commenting on the advantages enjoyed by the members of the Davenport Academy.

Drs. Hoepfner, Jaenicke, and Matthey, and Mr. M. H. Calderwood, of Eldridge, were elected to regular membership, and Mr. C. T. Simpson and Rev. J. P. MacLean as corresponding members.

H. A. Pilsbry presented a paper describing "A New Hydrobinoid Mollusk, with Notes on Other Rissoidæ."

Mr. Pilsbry also gave an interesting account of some "plants" of mollusks near Davenport. During a recent collecting trip to Sylvan Water, he found a mollusk new to the Mississippi River. On showing it to the Curator of the Academy, he was referred to Academy Proceedings, Vol. II., p. 26, where an account is given of Mr. Pratt having brought from Peoria, Illinois, fresh-water shells not found in this vicinity, and transplanting some of the living shells into Sylvan Water. Mr. Pilsbry's findings, ten years later, show that their new station proved favorable to the mollusks. He further desired to have recorded the planting of a land mollusk, *Mes. Albolabris*, on the Island, the specimens being from Des Moines.

In view of the approaching National Convention of the Agassiz Association, to be held in this city, the Academy voted to appoint committees to coöperate with the local Agassiz Clubs in any way which might be conducive to the success of the meeting.

*August 2, 1886.*—ADJOURNED MEETING.

President C. E. Putnam in the chair; twelve members and a number of visitors present.

Dr. Preston read an account of the exploration of a number of mounds near Toolesboro, Iowa, made on July 24, by a body of Academy members consisting of Messrs. E. P. Lynch, C. E. Harrison, H. C. Fulton, and himself. (Published in Vol. V., pp. 17-44).

On motion, the thanks of the Academy were returned to the citizens of Toolesboro for aid rendered the exploring party.

Resolutions were unanimously adopted of hearty support and coöperation with the State Convention of the Agassiz Association, to be entertained by the Davenport Chapter, August 24, 25, 26, 27.

Mrs. Putnam reported the receipts of the "Woodlawn Fete" for the benefit of the publication fund, to be \$126.15.

*August 27, 1886.*—REGULAR MEETING.

Vice-President C. E. Harrison in the chair; seventeen members present.

The following persons were elected to regular membership: Geo. E. Copeland, William C. Stevens, Herman Smith, A. Warnebold, E. A. Stanton, Thomas H. Jappe, W. M. Lillis, Dr. A. B. Dennis. For corresponding members: Prof. F. Starr, Cedar Rapids, Iowa; Prof. S. M. Tracy, Columbia, Missouri.

A paper was then read by A. Hageboeck on "*Amphioxus Lanceolatus*," illustrated by drawings and diagrams.

Mr. Pratt read a paper by W. A. Chapman, on the "Ancient Grooved Rocks in Arkansas." Both papers were referred to the Publication Committee.

*September 24, 1886.*—REGULAR MEETING.

President C. E. Putnam in the chair; nineteen members, a number of the Agassiz Chapter, and several visitors present.

Donations of unusual value were reported by the Curator, including a very fine collection of fossils from Prof. Barris; crinoids from Crawfordsville, Indiana; marine shells from Mr. Riepe; fossil shells from Mr. Pilsbry; a fossil ammonite, weighing twenty-five pounds from W. A. Chapman; section of a marine shell from China, donated by Mrs. Gamewell; and a collection of large photographs of the ruins of Charleston, from Prof. McGee of the United States Geological Survey.

Corresponding members were elected as follows: Dr. P. J. Farnsworth, of Clinton, Iowa, Professor of Materia Medica, Iowa State University; Mr. B. F. Waller, of New Palestine, Missouri; and Miss Belle M. Gilcrest, of Des Moines, Iowa.

A letter and the advance sheets of an article for "Science," by Prof. McGee, in regard to theories as to the causes of the Charleston earthquake, and the character of the work of the United States Geological Survey at that point, were read; and presenting the Academy a set of eight large photographs of scenes in and about the city.

Dr. McCowen then read a paper on "Earthquakes," a concise history from 1606 B. C., a summing up of the different theories as to causation now in vogue, closing with suggestions as to how science may render good services to humanity in recommendations as to building materials, methods of construction, etc., so as to render comparatively harmless the slight shocks which visit the United States and which are becoming more noticeable as the country is more thickly settled.

Dr. Parry then read an interesting account, by an eye witness, of the earthquake at New Madrid, Missouri; and Mr. James Thompson, a newspaper article on earthquakes, by Proctor.

The photographs sent by Mr. McGee, and a large map prepared by Mr. Pratt, added much to a clear understanding of the situation in Charleston.

Blanks sent out by the United States Geological Survey for the collection of information in regard to earthquake shocks, were distributed.

*October 29, 1886.*—REGULAR MEETING.

President C. E. Putnam in the chair, eleven members present.

Hal. Decker was elected as regular member, and Messrs. B. F. Goss and E. J. Hemmings, of Pewaukee, Carl Duerflinger, of Milwaukee, Wisconsin, and James Gurney, of St. Louis, Missouri, as corresponding members.

Letters were read from Prof. Starr, of Coe College, asking the loan of books; from Fred Stearns, Detroit, wishing exchanges; from Prof. P. J. Farnsworth, Clinton, and Miss Belle Gilcrest, Des Moines, acknowledging membership; from Captain Hall, asking a remittance to prepare and ship specimens he has collected.

A handsome case for the Entomological Collection was presented to the Academy in commemoration of the birth-day of J. D. Putnam, its former President. On motion of Dr. Parry, a vote of thanks was returned to Mr. and Mrs. Putnam.

A paper on "*Lastarria*" was presented by Dr. Parry and referred to the Publication Committee.

*November 23, 1886.*—TRUSTEES' MEETING.

President C. E. Putnam in the chair; ten members present.

Mrs. Putnam reported an effort on her part to raise an annual subscription of \$400 a year, for five years, to provide for the support of the Academy, and obviate repeated appeals to the public.

On motion, it was voted that Mrs. Putnam's plan for providing an annual support fund has the approbation of the Trustees.

A course of lectures or parlor meetings by home talent was proposed, and Mr. Phelps and Major McClelland were appointed a committee of arrangements.

On motion, the thanks of the Academy were voted to Mr. Kuhnen for the donation of a stove.

*November 27, 1886.*—ADJOURNED MEETING.

President C. E. Putnam in the chair; nine members present.

Curator reported the receipt of a barrel and several boxes from Captain Hall, containing mound pottery, stone implements, and a number of human skulls.

Mr. Harrison read the report, prepared by Mr. Pratt and himself, of the mound explorations made by them at Toolesboro, October 18th, resulting in the finding of but few relics, among which were human bones in a bad state of preservation, one skull, and the frontal bone of another, remarkably flat, a finely carved, smooth, and symmetrical curved base pipe, and some turtle shell fragments bearing artificial markings.

Mr. Pratt read a translation, made by Mr. Riepe and himself, of an interesting and valuable paper by Dr. Max Uhle, of Dresden, read before the Berlin Anthropological Society, entitled "Concerning the Elephant Carvings in America." Dr. Uhle reviewed the attack on the Academy of Sciences made by the Bureau of Ethnology, and discussed the co-existence of man and mastodon on the western continent, giving strong support to the affirmative theory. On motion of Mr. C. E. Harrison, it was resolved that the thanks of the Academy be tendered Mr. Max Uhle for his paper, and for the strong support given to the position of the Academy.

Mr. H. A. Pilsbry read by title a paper entitled "Notes on a Collection of Texan Mollusca," which was referred to the Publication Committee.

Mr. Pratt mentioned the fact that the Trustees of the British Museum have presented Dr. W. H. Barris with a copy of their great monograph on all known *Blastoidea*. It is a large quarto, containing twenty full page illustrations, numbering over four hundred figures. The gift is in recognition of his work in the same department of Natural History, which is published in the Proceedings of the Davenport Academy of Natural Sciences of last year's issue. The blastoids described by Dr. Barris are fully recognized, and frequent reference made to his work.

A letter was read from Mr. Gass, giving an account of an exploration made by himself, of mounds on Turkey River.

The following regular members were elected: Prof. Jerome McNeil, of Moline, Illinois, and E. B. Sanders, of Davenport; and for corresponding member, Miss Sue McCowen, of Englewood, Illinois.

*December 10, 1886.*—ADJOURNED MEETING.

Vice-President C. E. Harrison in the chair; fourteen members and two visitors present.

Mr. Fulton opened the discussion of the evening on "Fuel," with a very complete *resume* of the different kinds, their qualities and sources. He dwelt particularly on the vast waste in mining, in transportation, in handling, and, finally, in burning; and made important suggestions as to how much of it might be avoided. He also spoke of the various recent inventions for preparing valuable fuel from the immense masses of waste accumulated in the mining regions everywhere.

The subject was discussed by Dr. Hazen, Dr. Preston, and Messrs. Williston, Witherell, and Harrison.

*December 31, 1886.*—REGULAR MEETING.

President C. E. Putnam in the chair; fourteen members present.

Curator reported the donation of fossils by Rev. J. Gass, and a collection of one hundred fifty species of Florida shells by Mr. C. T. Simpson, Ogallala, Nebraska.

The following papers were read by title and referred to the Publication Committee, viz.: "Description of four new species of Myriapods from the United States," by Prof. Jerome McNeil, of Moline; "List of Mollusca collected in Florida," by C. T. Simpson, of Ogallala, Nebraska.

The following regular members were elected: Messrs. Fred. Heinz, Herman Steffen, T. L. Sharon, Emil Vollmer, William Stricker, Joseph Evans, Dr. A. M. Bowman, Theo. Krabbenhoft, George Krabbenhoft,

H. Abel, Jr., Melchior Hubinger, Adam Hubinger, Miss Grace Haddix, Miss Flora Haddix, Mr. A. L. Mossman.

It was ordered that a vote of thanks be tendered to Mrs. Newcomb for the base-burner heating stove presented to the Academy.

*January 5, 1887.*—TRUSTEES' MEETING.

President C. E. Putnam in the chair; eleven members present.

Mrs. Putnam reported \$330 pledged on the annual subscription.

*Voted*, To pay the following bills out of the first available funds:

Curator's Salary .....	\$166 66
Postage and Stationery .....	117 62
Repairs .....	96 44
Pictures of ex-President .....	21 75
Captain Hall .....	6 60

The list of membership was revised by striking from the Treasurer's books those who have declined to pay their dues when called upon, and those who have removed from the city.

*January 14, 1887.*—ADJOURNED MEETING.

Vice-President C. E. Harrison in the chair; ten members present.

The subject for discussion, "Weather Prognostications," was opened by Mr. Pratt, and included a consideration of equinoctial storms, the relation of the weather to tides and sun-spots, etc. The discussion was participated in by Messrs. Thompson, Fulton, and Harrison.

The theory of "Color" was then discussed by Messrs. Fulton, Pratt, Jappe, and Thompson.

*January 26, 1887.*—ANNUAL MEETING.

President C. E. Putnam in the chair; ninety-two members present.

The reports of the officers were read, as follows:

TREASURER'S REPORT.

GENERAL FUND.

*Receipts.*

Amount from former Treasurer .....	\$ 6 62	
Dues from ninety-three members .....	279 00	
Back dues collected .....	60 00	
Dues for 1887 .....	6 00	
Membership fees (twenty-four) .....	120 00	
Discount deposit, National Bank .....	250 00	
Proceeds of Woodland fete .....	126 15	
Contribution box, etc. ....	27 11	
Interest from Endowment Fund .....	87 48	
Amount from Scott County Medical Society .....	6 50	\$968 86

*Disbursements.*

Amount paid Curator .....	\$370 00	
" " for fuel .....	88 05	
" " Graham .....	48 00	
" " janitor .....	55 00	
" " for gas .....	36 25	
" " for water .....	16 00	
" " Marshalltown crinoids .....	13 85	
" " for freight and express .....	42 33	
" " for stamps, supplies, and incidentals .....	50 24	
" " for pamphlet, "Elephant Pipes" .....	128 00	
" " for insurance .....	34 00	
" " for 1885 bills, per vouchers .....	62 05	
" " for interest, Davenport National Bank .....	8 75	\$949 52
Balance on hand .....		\$ 19 34

● **ENDOWMENT FUND.**

Amount received from treasury .....	\$ 36 77	
" " " publication fund, per Mrs. C. E. Putnam .....	100 00	
" " " subscription, Prof. Young .....	5 00	
" " " J. E. Lindsay, life membership fee .....	50 00	
Balance on hand .....		\$ 191 77

*Condition of Endowment Fund, January, 1887.*

Old amount due from general fund .....	\$ 112 50	
Amount invested at 8 per cent .....	1,000 00	
Amount in savings bank at 5 per cent .....	191 77	
Total .....	\$1,304 27	
Less bills payable, note to Mrs. Newcomb, for purchase of four feet additional ground .....	320 00	
Net balance to credit of fund .....		\$ 984 27

**SPECIAL MOUND FUND.**

Received from private subscriptions .....	\$ 65 00	
Paid first Toolesboro expedition .....	\$20 85	
Paid second Toolesboro expedition .....	33 15	54 00
Net balance to credit of this fund .....		\$ 11 00

**PRESENT FLOATING DEBT.**

Due Curator, balance of salary .....	\$130 00	
" Mrs. Putnam, audited account .....	75 75	
" C. G. Hipwell, audited account .....	33 50	
" McClelland & Co., audited account .....	62 94	
" Egbert, Fidler & Chambers, audited account .....	42 62	
" Hastings, White & Fisher, audited account .....	21 75	
" Mrs. Putnam (furnished Captain Hall), audited account .....	6 60	
" Interest to Mrs. Newcomb .....	25 60	
" Davenport National Bank .....	250 00	\$648 76

*Less Offset.*

Collectible dues (estimated) .....	\$ 75 00	
Fees due from five members .....	25 00	100 00
Estimated deficiency .....		\$548 76

Respectfully submitted,

G. P. McCLELLAND,  
*Treasurer.*

## RECORDING SECRETARY'S REPORT.

## TO THE OFFICERS AND MEMBERS OF THE ACADEMY:

During the past year the following meetings have been held: Regular, 12; Adjourned, 8; Special, 3; Annual, 1; Trustees', 8. Total, 32.

Average attendance for meetings of the Academy, 15.

Average attendance for Trustees' Meetings, 9.

Thirty-nine regular, and 18 corresponding members have been added during the year.

Three regular members have been transferred to the list of life members.

Died during the year, Professor Sheldon.

Thirteen scientific papers have been read during the year, and the following topics of general interest discussed at the adjourned meetings of the Academy: "Railroad Telegraphy; Electric Motors for Street Cars; Aerial Navigation; Earthquakes; Fuel; Weather Prognostication."

To sum up, there have been held during the year a greater number of meetings, with a larger general attendance and a greater number of scientific papers read, than for a number of years.

Respectfully submitted,

JENNIE McCOWEN, M. D.,

*Secretary.*

## CURATOR'S REPORT. -- ABSTRACT.

## TO THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

The past year has been one of unusual activity and of almost unprecedented accessions to the collections, both in quantity and quality — among which are: The J. D. Putnam entomological collections and cabinets; the Alfred Sanders geological, mineralogical, and marine specimens and corals; the C. E. Harrison geological and mineralogical collection; the Barris collection, comprising seventy species of rare and beautiful specimens from the Paris basin, thirty species of ammonites, fifty species of crinoids; collections of cretaceous fossils from Arkansas, sent by W. A. Chapman; clusters of Coal Valley calcite crystal, from William Johnson; superb crinoids in the slabs from Marshalltown; two hundred species of Florida shells from C. T. Simpson; six hundred species of shells from H. A. Pilsbry; seven barrels and one box of stone implements, pottery, and skulls taken from southern mounds by Capt. W. P. Hall; sixty-two New England historical relics from G. F. Daniels; pipes, cloth-covered copper axes, awls, pearl beads, obsidian, mica, etc., obtained from mounds near Toolesboro, on the Mosier-Mallory lands, by C. E. Harrison, H. C. Fulton, E. P. Lynch, and Dr. C. H. Preston. [The names of twenty-six other contributors are given.] There are fifty-one large cases of collections in archæology, history, geology, mineralogy, botany, zoölogy, crustacea, entomology, ichthyology, paleontology, ornithology, etc.

Respectfully submitted,

W. H. PRATT, *Curator.*

## LIBRARIAN'S REPORT.

The Librarian, H. A. Pilsbry, having removed to Philadelphia, the report on the library was presented by W. H. Pratt, acting Librarian. (Abstract.)

The register shows an accession, during the year, of 1958 publications, embracing the usual range of home and foreign exchanges and public documents, and including a great many valuable and some very rare works.

The Library Committee, during the past year, has adopted a plan for a card catalogue of subjects, and has it well started, so that this important work, which will more than double the availability and value of the library, can be carried on as time and circumstances will permit. Members were urged to aid in this work. More shelf room is also imperatively needed, and large numbers of pamphlets and serials should be bound as soon as practicable.

## PUBLICATION COMMITTEE'S REPORT.—ABSTRACT.

Completion of Volume IV., of 1,500 copies; distributed 702.

Receipts, \$1,258.78; expenditures, \$1,227.18.

Volume V., now in process of publication, will contain as frontispiece the portrait of the late Prof. D. S. Sheldon.

MRS. M. L. D. PUTNAM, *Chairman*.

## PRESIDENT'S ANNUAL ADDRESS.

BY C. E. PUTNAM.

LADIES AND GENTLEMEN:

In the history of a society, as in the life of an individual, these recurring anniversaries subserve an excellent purpose. Upon occasions like the present we break away from the bonds of routine, and, standing, as it were, on the mount of observation, we look back over our traveled pathway, note our failures, estimate our progress, and thus enter with renewed zeal and more intelligent purpose upon the accomplishment of our great work. In an honest review of the past there is promise of a hopeful future.

It will be my purpose, in this brief address, to estimate the mission and influence of the Academy, and to offer some considerations tending to establish its proper position among the educational institutions of the city and state. If, in the discussion upon which I am about to enter, I should give expression to some propositions which may conflict with established opinions, it will, of course, be understood that the writer is alone responsible.

Preliminary to the special discussion I have in contemplation, I will briefly review some of the principal incidents of the past year. Notable among these was the completion and distribution of Volume IV. of the Proceedings of the Academy. This publication has been very generally sent in exchange to scientists and scientific societies in this country and Europe, and has been everywhere received with especial

favor, and, not infrequently, with high encomiums. The publication of Volume V. of the Proceedings has also been commenced, with some valuable papers giving the results of original researches in geology, paleontology, botany, conchology, and archaeology. The printing of this volume will proceed as rapidly as scientific papers are furnished the Academy, and provision can be made for the necessary funds to meet the expense. As will be seen from the very full and complete report of the Curator, there have been, during the past year, several valuable collections donated to the Academy, as well as considerable additions made to its museum through explorations conducted by its members. Among these it may be mentioned that several ancient mounds have been opened, and some exceedingly valuable relics added to our already large archaeological collection. These relics, as well as the other additions to the museum, are particularly described in the Curator's report, and hence will here be passed without special mention. It will appear from the report of the Secretary that there have been held, during the past year, eight meetings of the Board of Trustees, and twenty-three regular and special meetings of the Academy, with an average attendance of fifteen members. It further appears that there has been a considerable increase in the membership by the election of thirty-two regular, and fifteen corresponding members. These statistics are referred to as indicating a growing interest in the work of the Academy. The report of the Librarian shows a large increase to the library during the past year, and as these publications contain all the recent researches in this country and Europe, they are of great scientific worth. The interesting fact should not be overlooked that these large additions to our library are the direct result of the publication of our Proceedings, and in actual value will far exceed the expense incurred by the Academy for printing and distribution. The library of the Academy is thus becoming one of the largest and most valuable in the west, and is greatly in need of binding and cataloguing, in order that this rich scientific literature may be brought within easy reach of all workers in science. This department deserves, and should receive, special attention.

In connection with the publication and distribution of Volume IV. of the Proceedings, it should be stated the paper upon "Elephant Pipes and Inscribed Tablets," which was included as an appendix, has been generally accepted as decisive of the controversy in vindicating the reputation of Rev. Mr. Gass, and in establishing the integrity of these interesting specimens as genuine mound relics. In addition to the strong support received from the distinguished scientists whose communications were published in the second edition of that paper, we have been encouraged by still further and more emphatic testimonials. Notable among the distinguished gentlemen abroad who have thus championed our cause, I may mention M. le Marquis de Nadaillac, of Paris, France, and Dr. Max Uhle, of Dresden, Prussia. The former, in a paper entitled "*Les Pipes et le Tobac*," makes special mention of the unfounded accusations of Mr. Henshaw, and maintains the great antiquity of man in America, thus removing a principal objection to

the genuineness of the pipes and tablets. This paper contains illustrations of one of the elephant pipes, as well as some others in the Academy museum. The paper of Dr. Uhle was especially devoted to these relics, and, indeed, is entitled "Concerning the Two Elephant Carvings from America." It was published under the auspices of the Berlin Anthropological Society, of which the distinguished Prof. Virchow is president, and contains excellent illustrations of both elephant pipes. Dr. Uhle thus refers to the paper issued under the auspices of the Academy:

"Mr. C. E. Putnam, of the Davenport Academy, in an article upon the Elephant Pipes in the museum of the Academy, which appeared in Volume IV. of its Proceedings, has replied to Mr. Henshaw's attack, and though many may not have seen it, it was received by the writer of this article, as was also the second edition, who therefore considers it his duty to help to bring it to a larger audience."

Dr. Uhle then proceeds to notice the facts connected with the discovery of the relics in question, and the circumstances involved in this controversy in these emphatic terms:

"Henshaw has sought, by falsely representing that the tail is wanting in both pipes, to make a point against their genuineness. But on the originals, as well as on the correct pictures of them, the tails are plainly visible. Moreover, Henshaw was not correctly informed of the circumstances of the discovery. The arguments against the genuineness taken from the circumstances fail absolutely. Hence, the whole attack has been very badly prepared, and the points upon which he principally based his charge of unguineness are altogether without foundation. The impression, therefore, which we receive from the reply of Mr. Putnam is the opposite of that from Mr. Henshaw's paper, and is favorable to the genuineness of both these interesting relics."

Inasmuch as these two gentlemen occupy a foremost position among living archaeologists, their favorable judgments may reasonably be taken as decisive of this controversy.

In this review of the work of the Academy, I must not omit some mention of its business interests. These financial matters are of vital importance in promoting scientific research, and whether we delve in the deep strata of the earth, or explore the star depths of the universe, this "filthy lucre" becomes essential to our researches. The truly scientific man, accustomed, as he is, to precision in all his operations, should also be a good business man. It becomes us, therefore, in furnishing a report of our scientific work, to also present to the patrons of the Academy a good balance sheet, and whenever an indebtedness shall appear thereon, it should be made clear that it was wisely incurred, and represents true scientific progress. "Pay as you go" is a good rule for both societies and individuals, and yet indebtedness does not always indicate improvidence. Thus, at the close of the great civil war, the ledger of the nation exhibited an enormous deficiency, but, when turning to the other side of the account the government was found credited with the emancipation of a race, this very indebtedness appeared encircled with a halo of glory. So, too, when the Royal Society of England

found itself without sufficient funds to publish the great work of Sir Isaac Newton, and was compelled to accept the generous contribution of the noted astronomer, Edmund Halley, to enable it to give to the world the most wonderful discovery ever made on this planet, every dollar of the financial obligations thus incurred became radiant as a star. Thus it is, while the cash system furnishes a good rule of conduct, it is undoubtedly true that in the history of a scientific society exigencies may arise when it is justifiable to anticipate future resources, but ceaseless care should be observed that no indebtedness is incurred which can be set down by the most captious as improvidence.

It will be unnecessary for me to go over the financial details of the past year, as they have been clearly presented in the Treasurer's report. It appears therefrom that our stated income has been insufficient to meet all necessary expenses, thus leaving a small balance of indebtedness; but it is evident from the reports of the Librarian, Curator, and Publication Committee, that there has been no unwise expenditure. The generous patrons of the Academy have, however, recently inaugurated a scheme which will, in a large measure, relieve it of these small financial embarrassments. A subscription has been started, and has already received the signature of many influential citizens, whereby the subscribers obligate themselves to pay, for five years, an annual amount, the aggregate of which, with the sums received from yearly dues of members, will be sufficient to meet all ordinary expenses.

These financial drawbacks sometimes seem to be serious obstacles in our pathway, but in surmounting them it may be we are acquiring that hardihood which insures ultimate success. In moments of discouragement it will profit us to recall the like experiences of other and older societies which have become famous in the world's history. Take for example some of the well-known societies of London, England—such as the Royal Society, the Royal Institution, the Society of Arts, the Institution of Civil Engineers, the Chemical Society, the London Institution, the Birkbeck Institute, the Society of Telegraphic Engineers, the Museum of Practical Geology, the Statistical Society, and the Royal Geographical Society. All these famous institutions have been, like our own, inaugurated and conducted through private enterprise, and without government aid, with perhaps the exception of the last named, which has, I believe, received a small subsidy. In reviewing the history of these institutions we find their experiences not unlike our own, and the narrative of some of their financial difficulties reads like a page from our own records. Thus, in explaining the inability of the Royal Society to publish the immortal "Principia" of Sir Isaac Newton, it is stated as a reason that "the finances of the institution had been so terribly depleted that even the salaries of the regular officers were in arrears. Members did not pay their subscriptions, and some of them, like Newton, were specially exempted from payment of their yearly fifty-two shillings, on account of the inadequacy of their means." This great institution, however, surmounted all these financial tribulations, and became the leader in scientific progress throughout the world. So great and important, indeed, have been its achievements that in com-

menting upon its publications Mr. Huxley expressed the opinion that "if all the books in the world except the Philosophical Transactions were destroyed, it is safe to say that the foundation of physical science would remain unshaken, and that the vast intellectual progress of the last two centuries would be largely, though incompletely, recorded." Such experiences, and such triumphs, even at so great a distance, should allay all our discouragement, and inspire us with zeal and purpose to build up here in the far-away valley of the Mississippi, an institution which may become a beacon light throughout the scientific world.

The impression is extensively entertained that only those whose situation in life gives them abundant leisure can engage in scientific pursuits, and hence that a scientific man cannot at the same time be a practical business man. Without doubt these erroneous impressions have deterred many of those engaged in some of the industrial callings from taking an active part in scientific research. A review of the lives of some of the most noted scientific investigators will, however, reveal the fact that, like Hugh Miller, they have steadily pursued some one of the industrial callings, and have only given their leisure hours to scientific pursuits. Upon this subject the late Lord Brougham made these wise observations:

"Some of the great philosophers in all ages have been engaged in the pursuits of active life, and an assiduous devotion of the bulk of our time to the work which our condition requires is an important duty, and indicates the possession of practical wisdom. This, however, does by no means hinder us from applying the rest of our time, beside what nature requires for meals and rest, to the study of science, and he who, in whatever station his lot may be cast, works his day's work, and improves his mind in the evening, as well as he who, placed above such necessity, prefers the refined and elevating pleasures of knowledge to the low gratification of the senses, deserves the name of a true philosopher."

These earnest words of a great thinker should encourage all the sons of toil to select from among the many branches of science some one for special study; giving to it their morning and their evening hours, with their days of leisure, it will grow with wonderful rapidity. As they pass to and fro from their homes to their places of business, new truths will seem to beckon them onward, new revelations of nature will call them to higher realms of thought, and as one by one they master the secrets of creation they will learn the worth of being, and attain to the dignity of true manhood. The knowledge thus acquired will pass into their experiences like a benediction—lightening toil, assuaging trouble, and elevating life with a lofty purpose.

In this review I must not omit reference to the museum of the Academy, undoubtedly the largest in the west, and containing collections, especially in entomology, palentology, and archæology, which are of great scientific value. The care and classification of this large and increasing mass of material demands the constant attention of a zealous and skillful Curator, and thus entails upon the Academy the larger portion of its current expenditures. This Society has been for-

fortunate in securing for this position, at an extremely moderate compensation, the services of an earnest and competent gentleman who, more than any other person, has contributed to the establishment of this institution on a firm and enduring basis. It must be borne in mind that the museum is thus maintained and thrown open to the public for the benefit of all students of science. It affords no income to the Academy, and entails only expense, and yet as an educational institution it is of inestimable value. No doubt it is true that scientific researches may be pursued, and new discoveries published to the world without the collection of a museum, and therefore we have to expect from the public, for whose benefit it is maintained, liberal contributions toward its support.

This line of thought suggests various inquiries it may be well to ponder. What is the meaning of the scientific enterprise in which we are engaged? Are the researches in which the members of the Academy are so profoundly interested pursued only through idle curiosity, or have they a practical purpose? Is our museum a mere curiosity-shop, or is it a leaf carefully translated from the great volume of nature? In seeking a solution of these deep questions it will be apparent that the Academy fills an important place in the advancement of culture, and that it and other like institutions are forerunners of the new and true education. As an adjunct to our public school system, the museum of the Academy can be made of inestimable value. It is well known to all investigators that the truths of science cannot be learned alone from books, but need to be verified by researches in the field and laboratory, and this it is that gives to the scientific collections in our museum their great educational value.

I will now ask your attention to a brief consideration of the practical value of scientific study. I refer here not so much to the inestimable worth of these researches in the discovery of pure truth, as to the influence of its discoveries in advancing the material well-being of the citizen, and thus strengthening the foundations of the state. It is related of Michael Faraday and Joseph Henry that they refused to reap any pecuniary reward from their great discoveries, and hence, as soon as their scientific researches attained a point where invention made them practically useful and gave them a commercial value, they then abandoned that field of study, assured that the large number intent on gain would complete the work, and themselves pressed onward, like veritable pioneers, toward the frontiers of knowledge, to again engage in the higher and more congenial employment of disinterested research. While it is doubtless true that to the earnest student of science the discovery of new truths is its own sufficient reward, still, in seeking to secure the adoption of physical research into the busy practical life around us, it is fitting that we should give appropriate consideration to the economic values of these science studies. Consider, then, for a moment, how intimately scientific discoveries, and the mechanical inventions which follow in their wake, are interwoven into the web and woof of our social, civil, and political institutions. Take, for example, from the circle of sciences some of its principal branches, like botany,

zoölogy, geology, mineralogy, chemistry, meteorology, astronomy, and the undulatory forces, light, heat, and electricity, and see how largely they contribute to the needs of our daily life, and the requirements of modern civilization. Thus, the discovery of magnetism and electricity has been followed by inventions which have given to humanity the telegraph, the telephone, and the electric light. By the telegraph, time and distance have been well-nigh obliterated, and nations, though separated by seas and continents, are now brought into hourly communication, and through the net-work of friendly relations thus woven round the earth, war has almost disappeared from human history. By the use of the telephone an entire community is enabled to engage in familiar conversation as though collected under one roof, and even the inhabitants of neighboring cities, without leaving their homes, may carry on with each other the ordinary transactions of business life. Thus, too, the discovery of the expansive powers of steam has been followed by mechanical inventions which have subjected it to human control, and made it "the drudge of civilization." This almost superhuman power now enters into all the industries of life, and, by increasing the productive power of labor, has elevated the race. It has been estimated that by the use of steam the resources of labor have been augmented a thousand-fold, and that, in the manufactories of Great Britain alone, "the power which steam exerts is equal to the manual labor of four hundred millions of men, or more than double the number of males supposed to inhabit the globe." So, too, by the use of steam in navigation, and for operating railroads, and the facilities thus afforded for rapid travel and transportation, trade and commerce have been widely extended over the vacant places of the earth, and thus large value given to hitherto vast unproductive areas. But for the net-work of railroads which cover our western prairies, these broad tracts now teeming with abundant harvests would be nearly valueless. So, also, researches in optics, with the aid of chemistry, have given us photography, and the Spectrum Analysis, which are among the most important discoveries of recent years. Photography is not alone the artist of society, but, as the aid of modern science, it goes into the far reaches of space to faithfully record the most evanescent of celestial phenomena, and into the depths of the sea to depict the strange secrets for the wondering gaze of man. The spectrum analysis, though less intimately associated with our daily lives, is no less wonderful. It gives us a deep insight into the elements of the earth, and reveals the composition of the heavenly bodies. This, as you all know, is accomplished through the decomposition of light, and thus, by a careful comparison of the spectra of earthly substances with those of the celestial bodies, astronomers have been able to detect many of the materials of which they are composed. So, also, the recent researches in anatomy, physiology, and hygiene, have been of inestimable value to the race. By the information thus acquired concerning the organs of the body, their functions in the economy of life, and their proper care and treatment, ills have been removed, disease brought under control, and life itself greatly prolonged. As a direct result of this scientific progress, it is claimed that "as large

a number of persons now live to seventy years as lived to forty three hundred years ago," and, in striking confirmation of this, it is a well-known fact that the British government, in the management of its system of annuities, which is based upon the average of life, was, some years since, in consequence of this prolongation of life, compelled to revise its calculations. It may be mentioned, in this connection, that it has been claimed that the single discovery of the anæsthetics is of greater value to the human race than all the arts, literatures, and achievements of ancient civilizations. The passing glimpse we have thus taken of the great practical advantages resulting from scientific study, while necessarily meagre and imperfect, will sufficiently reveal the transcendent importance of these researches, and justify us in claiming for science a prominent, if not first place, in any general system of education.

When we contemplate the enormous progress made in scientific discovery during recent centuries, we are led to inquire as to the causes which have set in motion this great movement, and, not without reason, we look to our institutions of learning—our universities, colleges, academies, and seminaries—for the instrumentalities which have inspired this study of nature, and produced the extraordinary developments of modern science. When, however, we come to examine the curricula of these institutions, we find that, with, perhaps, the exception of the German universities, they have given but little or no aid to scientific research. Strange as it may seem, it will be disclosed that the remarkable advances made in scientific research and discovery have been almost entirely accomplished through individual zeal and enterprise, and through scientific societies and academies established and maintained by private munificence. The great universities of England and America have devoted their energies mainly to the study of Greek and Latin, and the other scholastic branches usually included in a classical course, and have left science to shift for itself. It will further be found that the example set by these great institutions has reached down through all the gradations of educational organizations, and influenced even the course of study in our public schools. I am not disposed to undervalue a classical education, and readily concede the worth of these linguistic studies in giving exactness and elegance in the use of language. I am free to admit that the clergyman, the physician, the lawyer, the journalist, and the scholar trained for literary pursuits, if they do not find them essential, will derive benefit from these classical studies. I am, however, impressed with the conviction that the English language, which furnished a sufficient vocabulary for Shakespeare, Addison, Goldsmith, for Lowell, Longfellow, and Bancroft, should be ample for the graduates of our public schools, and that the study by the pupils in these schools, of all foreign languages, dead or living, is not only a sheer waste of time, but a culpable perversion of the system. I therefore maintain that these branches should be dropped from the curriculum of the public schools, and that there should be substituted such instruction at least in anatomy, physiology, hygiene, as will induce correct living, such skill of hand as will fit its graduates for some industrial calling, and such knowledge of civics as will secure intelligent citizenship.

In connection with this subject of scientific education, it will be remembered that during the past summer there assembled in this city the National Convention of the Agassiz Association of America, an organization mainly composed of pupils from the public schools and students in college, and having for its principal object the study of the natural sciences. All who attended the proceedings of this convention must have been struck with the decorum of its deliberations, and greatly impressed with the accuracy of their knowledge and the wide scope of their researches. It was certainly an extraordinary spectacle, and the fact such a movement had become necessary to accomplish objects so eminently desirable is, in itself, a most complete and emphatic condemnation of the existing systems of education. Who ever heard of conventions being held to encourage and promote the study of Latin, or Greek, or grammar, or logic, or rhetoric, or geography, or history, or any other kindred studies usually found in the curricula of our educational institutions? It is only left for neglected science to thus force itself into prominence and place.

This review of the work of the Academy would be incomplete without some reference to the great question of religion as connected with the researches of science. It has been wisely provided that topics of a partizan or sectarian character shall not be introduced into the discussions of the Academy, but inasmuch as no nation nor race has ever been found on this planet without some form of worship, the anthropologist must needs accept religion as a scientific fact. It is usual, I know, to approach these questions with bated breath, and to handle them with a velvety touch, but I am unable to see why God's word should be more sacred than his works, or why His creation is less entitled to reverence than His revelation. If these relations have been unfriendly, it is because of empiricism in science and bigotry in religion. The severe student of science, it is true, may find that his mathematical training will not enable him to unravel the tangle of the trinity, that his mastery of logic is wholly inadequate to the reconciliation of foreknowledge, free-will, and predestination, and that his profound study into the wise adaptations and beautiful harmonies of the created universe disclose no fitting place for the location of that abyss of eternal fire said to have been provided for intellectual unbelief, and thus when he tears down these "fine spun ecclesiastical cobwebs," he too often makes the mistake to throw away with them all religion, but he should consider that its essentials still remain, the incentive to good conduct and correct living, reverence for God's work and word, and the expectation of immortal life. On the other hand, when Tyndall tells of matter so richly endowed as to have in it "the promise and potency of all life," and when Huxley announces that protoplasm is the common foundation of all forms of life, and when Darwin seeks to account for "the origin of species" by his famous hypothesis of evolution, the ecclesiastic in his fright cries aloud against the scepticism of science, but he should consider that the beautiful phenomena disclosed by their researches only add to the unexplained wonders of creation, and do not touch the mysteries of time and space, of matter and mind,

of the origin and destiny of man. It thus appears that the scientists and ecclesiastics are working on parallel lines, toward the solution of the same problem—the one seeking the true interpretation of God's revelation, the other of God's creation, and while there have been religious bigots who have burned the Brunos, and persecuted the Galileos of science, it is no less true that there are also scientific "bigots" who, because of some errors of ecclesiasticism, seek to destroy all religion.

In now retiring from this honorable position, I will call attention to the fact that the wise practice has prevailed in the Academy of observing the rule of annual rotation in filling the office of President, and I believe the only departure from this custom since the reorganization of the institution was at the last election, when, because of the controversy then pending, it was deemed desirable to continue the management. The proceedings of this meeting, therefore, will conclude my second term in the position of President, and I am gratified at being able to state that, through the energy and zeal of its active members, the interests of the Academy have been greatly advanced during this period, and that this society now occupies an enviable position in the world of science. The high rank it has attained, however, entails upon its members increased responsibilities, and should inspire them to engage only in genuine scientific work. The standing of the Academy has now become so conspicuous, and its proceedings so closely watched, its members cannot afford to relax their efforts, or lower their aim, but should labor earnestly, honestly, persistently, to retain its advanced position, and so to realize the high ideals entertained by the founders of the institution.

The election of officers was next in order, and balloting resulted as follows:

*President*—CHARLES E. HARRISON.

*First Vice-President*—J. B. PHELPS.

*Second Vice-President*—Dr. L. FRENCH.

*Recording Secretary*—Dr. JENNIE McCOWEN.

*Corresponding Secretary*—CHARLES E. PUTNAM.

*Treasurer*—NICHOLAS KUHNEN.

*Curator*—W. H. PRATT.

*Librarian*—H. A. PILSBRY.

*Trustees*—1st, Prof. W. H. BARRIS; 2d, G. P. MCCLELLAND; 3d, J. B. PHELPS; 4th, C. E. PUTNAM. To fill vacancy, W. H. PRATT.

Mr. Harrison was then escorted to the chair, and in a few well-chosen remarks thanked the members for the honor conferred upon him.

A rising vote of thanks was extended to Mr. Putnam for the ability with which he has guided the affairs of the Academy during the two years of his incumbency.

*January 28, 1887.*—REGULAR MEETING.

President C. E. Harrison in the chair; thirteen members present.

A letter was read from Prof. O. W. Collett, of St. Louis, stating that Mr. Henry Shaw, of that city, had recently purchased and presented to the Missouri State Historical Society the very valuable library of the late Bishop Robertson; and, on motion, the following resolutions were unanimously adopted:

WHEREAS, We have learned with great satisfaction of the recent purchase of the very valuable library of the late Bishop Robertson, and the presentation thereof to the Missouri State Historical Society, by Henry Shaw, of that city; and

WHEREAS, Such generosity and true appreciation of the said society as the worthy and suitable custodian and owner of such precious documents, and the recognition of the value of such institutions as conservators of true history and aids to study and research, seem to us to be of much more than local importance; and

WHEREAS, Such conspicuous and noble examples must tend to attract the attention of public-spirited individuals everywhere, and to induce those who are able to contribute of their abundant means to the building up and support of worthy historical and scientific institutions in their own localities; therefore

*Resolved*, That we hereby tender our most hearty thanks to Mr. Henry Shaw for his munificent gift to the Missouri Historical Society, of a collection of rare books, whose great value will increase with time; and we desire to express and record our high appreciation of his far-seeing and wise liberality.

*Resolved*, That these resolutions be given to the city papers for publication, and copies of the same be sent to Mr. Shaw and to the Missouri Historical Society.

The following resolution, offered by Mr. Putnam, was adopted:

*Resolved*, That a special committee of three be appointed, to make careful examination of the Constitution and By-Laws of this Academy, in connection with the various amendments thereto which have been from time to time adopted, and to report such modification or revision thereof as may seem essential or desirable, together with such additional provisions as they may deem proper to recommend.

The chair appointed as such committee, Messrs. C. E. Putnam, Dr. C. H. Preston, and J. H. Harrison.

Mr. H. C. Fulton read a paper on "Words," reciting numerous curious instances of the adoption and use in English of various Anglo-Saxon and Latin words and their derivatives.

The President then announced the following committees for the ensuing year:

*Finance*.—Nicholas Kuhn, Charles E. Putnam, G. P. McClelland.

*Publication.*—Mrs. M. L. D. Putnam, Prof. W. H. Barris, Dr. C. H. Preston, James Thompson, Dr. C. C. Parry.

*Museum.*—W. H. Pratt, archæology; W. H. Barris, paleontology; W. H. Hatch, ichthyology; Jerome McNeil, entomology; H. A. Pilsbry, conchology; William Riepe, history.

*Library.*—H. A. Pilsbry, H. C. Fulton, Charles E. Harrison.

*January 28, 1887.*—TRUSTEES' MEETING.

President C. E. Harrison in the chair; eleven Trustees present.

On motion of Mr. Fulton, the services of Mr. Pratt, as Curator, were retained, at \$500 per annum.

Voted, that the Finance Committee be authorized to fund the floating debt of the Academy.

*February 23, 1887.*—TRUSTEES' MEETING.

President C. E. Harrison in the chair; nine Trustees present.

Mr. W. H. Pratt elected Deputy Treasurer.

The following bills were presented, and ordered paid out of the first available funds:

Glass & Axtman.....	\$9 10
Robert Clayton .....	2 80
A. J. Lerch & Bro.....	2 75

*February 25, 1887.*—REGULAR MEETING.

President C. E. Harrison in the chair; nine members present.

The following persons were elected to regular membership: Messrs. F. E. Pomeroy, John N. Greer, W. C. Preston, Henry Vollmer, Joseph Allen, H. W. Techentin, J. W. Bollinger. The following corresponding members were elected: Miss Olive E. Coffeen, Minneapolis, Kansas, and George P. Hoerring, Iowa City, Iowa.

The committee on the revision of the Constitution and By-Laws reported as follows:

TO THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

The undersigned, appointed a special committee to revise the By-Laws of the Davenport Academy of Natural Sciences, in the performance of the duty assigned them, have thought it best to also include some unimportant verbal modifications in that part of the Constitution not included in the Articles of Incorporation; and which said revision of the By-Laws and Constitution, as prepared by your committee, is herewith annexed.

CHAS. E. PUTNAM.  
C. H. PRESTON.  
J. H. HARRISON.

CONSTITUTION  
OF THE  
DAVENPORT ACADEMY OF NATURAL SCIENCES.

(The following Constitution includes the substance of the Articles of Incorporation adopted January 9th, 1875, and amendments thereto adopted January 2d, 1878):

ARTICLE I.—NAME AND OBJECT.

*Section 1.* This society shall be known as THE DAVENPORT ACADEMY OF NATURAL SCIENCES, and shall have for its objects the increase and diffusion of a knowledge of natural sciences, by the establishment of a museum, the reading and publication of original papers, and other suitable means.

ARTICLE II.—MEMBERS.

*Section 1.* This society shall consist of regular, honorary, and corresponding members, who shall be elected in such manner as the By-Laws may prescribe.

*Section 2.* The right of voting and holding office shall be confined to regular members, but honorary and corresponding members shall be entitled to all other privileges.

ARTICLE III.—OFFICERS AND TRUSTEES.

*Section 1.* The officers of the Academy shall consist of a President, two Vice-Presidents, Corresponding Secretary, Recording Secretary, Treasurer, Librarian, and Curator.

*Section 2.* The President, Recording Secretary, and Treasurer, with twelve (12) other members, all of whom must be residents of Scott County, Iowa, shall form a Board of Trustees for the management of the business of the Academy and to conduct its proceedings, and a majority of such members shall constitute a quorum for the transaction of business.

*Section 3.* The officers and four members of the Board of Trustees, to serve three years, shall be elected by ballot, at the annual meeting on the first Wednesday of January in each year, and must receive a majority of the votes cast—only one officer or trustee being elected at each balloting. In case of a vacancy, caused by the death or resignation of any officer or Trustee, an election shall be held to fill the same, at the next meeting after the announcement thereof is made.

ARTICLE IV.—ACQUISITION AND MANAGEMENT  
OF PROPERTY.

*Section 1.* The Academy may receive, hold, and manage all property acquired by gift or purchase, necessary or proper to promote its objects.

*Section 2.* No contract for the purchase of real estate shall be entered into, nor shall any improvements thereon be made, nor shall such property of the society be sold, except in accordance with the affirmative vote of a majority of the members of the society, present at a special or business meeting held after due notice given, specifying the objects thereof.

## ARTICLE V.—BY-LAWS.

*Section 1.* The Board of Trustees, subject to the approval of the society, shall have the power to make all needful By-Laws, Rules and Regulations for the purpose of carrying out the objects of the society and conducting its affairs, and not inconsistent with the Constitution and Articles of Incorporation.

## ARTICLE VI.—JOURNAL OF PROCEEDINGS.

*Section 1.* A Journal of the Proceedings, By-Laws, Rules, and Regulations, and an account of all receipts and disbursements, shall be kept by the Secretary and Treasurer for the inspection, at all times, of the members of the society.

*Section 2.* At the annual meeting, the Board of Trustees shall make a written report of the proceedings, which report shall embrace a full statement of the business affairs of the society.

## ARTICLE VII.—AMENDMENTS.

*Section 1.* The provisions of the Articles of Incorporation, as provided therein, may be amended at any regular meeting of the Academy by a vote of two-thirds of the members present; *provided*, the proposed amendments have been presented to the Board of Trustees, in writing, at least one month prior thereto, and notice thereof published in some newspaper in the city of Davenport, stating the substance of the proposed amendments. The Board of Trustees shall present to the Academy any amendment thus offered, with a report on the question of its adoption, and with such modifications as they may see fit to recommend.

*Section 2.* The provisions of the Constitution, not embraced in the Articles of Incorporation, may be amended at any meeting of the

society by a vote of two-thirds of the members present, but the proposed amendments must have been presented to the Board of Trustees, in writing, at least one month before the day of meeting. The Board shall present to the Academy any amendment thus offered, with a report on the question of its adoption, and with such modifications as they may see fit to recommend; but no additions or amendments to the Constitution inconsistent with the Articles of Incorporation shall be made, except as herein before provided for amendments thereto.

#### BY-LAWS.

(As revised and adopted March 25th, 1887.)

#### ARTICLE I.—DUTIES OF OFFICERS.

*Section 1.* The President, or in his absence or inability to serve, one of the Vice-Presidents, in their order, shall preside over the meetings of the Academy and Board of Trustees; shall nominate all committees other than those specially excepted, and call such special meetings as he may deem necessary, or as he may be requested to call by the members. He shall, at the annual meetings, make a report on the condition and progress of the Academy, in all its departments.

*Section 2.* The Corresponding Secretary shall conduct and preserve the correspondence of the Academy; keep correct copies of all letters written on the business of the Academy; acknowledge the receipt of all donations from persons who are not regular members of the Academy; notify all corresponding and honorary members of their election, and keep a correct list of all such members, with the date of their election, and resignation or death.

*Section 3.* The Recording Secretary shall take and preserve correct minutes of the proceedings of the Academy and Board of Trustees in books to be kept for that purpose; shall have charge of all records belonging to the Academy; shall notify regular members of their election and committees of their appointment; shall keep a correct list of the members of the Academy, with the date of their election, and resignation or death; and shall notify regular members of all meetings and officers of all matters which shall occur at any meeting requiring their action.

*Section 4.* The Treasurer shall attend to all receipts and disbursements of the Academy, giving such bonds as the Board of Trustees may require, and shall make a general report, to be laid before the

Academy at the annual meeting, and at other times when called for by the Board, and furnish proper vouchers for such payments.

*Section 5.* The Librarian shall take charge of all books belonging to or deposited with the Academy; keep a catalogue of the library, in which the names of the donors shall be inscribed, with the dates of reception, and shall observe and enforce such regulations as the Board shall from time to time make for the use of the books.

*Section 6.* The Curator shall have charge of the museum and scientific collections of the Academy, assisted by such committees as may be appointed by the Academy. He shall superintend the exchange of duplicates, keep a record of all donations made to the museum, and report all additions at the annual meeting.

*Section 7.* The officers shall be elected by ballot, at the annual meeting, and must receive a majority of the votes cast—only one officer being elected at each balloting.

*Section 8.* In case of vacancy, caused by the death or resignation of any officer, the fact shall be announced to the Academy by the President at the next regular meeting thereafter, and an election to fill the vacancy shall be had at the next regular meeting after such announcement shall have been made.

*Section 9.* The Board of Trustees shall have control of all expenditures of money, make rules for the use of the library and museum, special rules for the Librarian and Curator, and shall have full power to act for the interests of the society, in any way not inconsistent with the Constitution and By-Laws.

## ARTICLE II.—MEMBERS.

*Section 1.* Regular members shall be elected in the manner hereinafter prescribed, and shall pay an initiation fee of five dollars (\$5.00). Candidates for regular membership must be recommended, in writing, by two reputable members, from personal acquaintance with applicant, and shall be proposed at a regular meeting, and balloted for at a subsequent regular meeting. All applications for regular membership must be in writing, subscribed by applicant and accompanied by the required initiation fee.

The business of the Academy shall be exclusively managed by, and its officers elected from the regular members; but no member shall be elected to office within the period of one year after his election to membership, nor thereafter if delinquent in the payment of his dues, or the performance of his duties as a member; nor shall a member be

allowed to vote within one year after his election, at the annual meeting for the election of officers and Trustees.

*Section 2.* Any regular member may, at any time after his election, become a *Life Member* by paying into the treasury of the Academy the sum of one hundred dollars (\$100.00), and notifying the Recording Secretary that he desires to be enrolled as a life member.

*Section 3.* Any persons who may be interested in the study of natural science, or desirous of promoting the interests of the Academy, may be elected as corresponding members, and shall have all the privileges of regular membership except those of voting and holding office. Corresponding members shall be elected in the same manner as regular members, and may become regular members by notifying the Recording Secretary that such is their desire, and paying the initiation fee.

*Section 4.* Honorary members shall be selected from persons eminent for their attainments in science on whom the society may wish to confer a compliment of respect, and shall have all the privileges of regular members except those of voting and holding office. They shall not exceed forty (40) in number, not to exceed twenty (20) of whom shall be residents and citizens of the United States. Honorary members shall be elected only at the annual meeting.

*Section 5.* All members shall be elected by separate ballot and must receive the affirmative vote of at least four-fifths of the members present. Any rejected candidate shall have his initiation fee returned, and shall not be eligible for membership within one year after such rejection.

Any member in good standing may withdraw from the Academy by giving written notice of his intention to do so, and paying all arrearages due from him. Any member who shall neglect to pay his annual fee within one year after it becomes due, shall, upon being notified by the Treasurer, personally or by notice mailed to his last known address, and not paying within one month thereafter, forfeit membership; and any member who is thus delinquent shall not be entitled to vote at the annual or other meetings.

Members may be expelled from the Academy for cause, after a due hearing, by a vote of not less than two-thirds of the members present at any regular meeting.

Every regular member shall be subject to an annual fee of three dollars (\$3.00), commencing on the first of January next following his election, and payable to the Treasurer, in advance.

The Board of Trustees may exempt a member from payment of fees when, from peculiar circumstances, they shall deem it for the interests of the Academy to do so.

#### ARTICLE III.—COMMITTEES.

*Section 1.* The Standing Committees shall consist of an Executive Committee, and Committees on Finance, on the Museum, on the Library, and on Publication. The President shall appoint all the standing committees, with the exception of the Executive Committee, at the annual meeting or the first regular meeting thereafter.

*Section 2.* The Executive Committee of the Board of Trustees shall consist of five members; and the President, Curator, Librarian, Recording Secretary, and Treasurer shall, *ex-officio*, constitute the same. This committee, under the direction of the Board, shall be empowered to provide fuel and other needed supplies, to order necessary repairs, to direct as to all ordinary matters of daily routine, and to exercise general supervision over the property and affairs of the Academy. The Executive Committee shall keep a record of their doings and expenditures, which shall be submitted to the Board of Trustees for review and confirmation.

*Section 3.* The Committee on Finance shall consist of three members, and it shall be their duty to take into consideration all subjects directly connected with the financial interests of the Academy; to recommend from time to time such action as may seem advisable for raising necessary funds for regular or extraordinary expenses, and at each annual meeting to present an estimate of the funds required for the ensuing year, with suggestions in reference to the best possible means of securing the same. The Treasurer shall be, *ex-officio*, a consulting member of this committee, and attend its meetings, but shall not be entitled to a vote therein.

*Section 4.* The Committee on Publication shall consist of five members, and shall from time to time cause to be published, and superintend the publication of, such papers read before the society, and such portions of the records of proceedings as may seem to them calculated to promote the interests of science, so far as the funds appropriated by the Board will permit.

*Section 5.* The Museum Committee shall consist of one member from each department of the museum, who shall assist the Curator in taking charge of and arranging all donations and deposits in their several departments, and shall carefully label each article.

*Section 6.* The Library Committee shall consist of three members, who shall have charge of all books belonging to or deposited with the Academy, and shall have power to make such exchanges of duplicates as may appear desirable.

*Section 7.* All committees must report in writing, and every report must be signed by a majority of the committee offering it. All special committees must report at the regular meeting next succeeding their appointment.

The President shall be, *ex officio*, a consulting member of all standing committees, and authorized to be present at their meetings, but shall not be entitled to a vote.

#### ARTICLE IV.—MUSEUM AND LIBRARY.

*Section 1.* All members, and the public generally, shall have access to the museum at such times and under such regulations as the Board shall determine.

*Section 2.* No specimens shall be removed from the museum without leave of the Curator and committee of the department to which they belong, who shall take a receipt for the same and be responsible for their return in good order.

*Section 3.* The Rules and Regulations for the use of the library shall be printed and exposed in the library rooms.

*Section 4.* None but members of the Academy shall be entitled to the use of the library; but the Librarian may, at his discretion, permit persons not members to consult the books at the rooms of the association.

*Section 5.* Books on deposit shall not be taken from the Academy rooms without the consent of the owner, and periodical and new publications shall remain on the tables for one month after their reception.

*Section 6.* The Librarian or Curator may allow members to draw books from the library for the purpose of study, or in the preparation of papers, and when books are so drawn, the Librarian or the Curator shall record in a book for the purpose, the title of the volume, name of drawer, and date of drawing, and, on its return, the date of return.

*Section 7.* Books shall not be kept out longer than one calendar month at a time, and may be called in sooner by the Librarian.

*Section 8.* No person shall retain more than two volumes at any one time, and books returned shall not be redrawn by the same person before three days after their return.

*Section 9.* Holders of books keeping them out longer than one month at a time, or three days after notification to return by the Librarian, shall be liable to a fine of five cents a day for each volume so retained.

*Section 10.* If a book shall be lost, destroyed, or injured, further than by reasonable wear, the drawer shall be liable for the damages to the volume or set, as assessed by the Board of Trustees.

#### ARTICLE V.—MEETINGS.

*Section 1.* The Annual Meeting shall be held on the first Wednesday in January, at which time the election of officers for the ensuing year shall take place, and the reports of the retiring officers shall be heard.

*Section 2.* The regular meetings of the Academy shall be held on the last Friday of each month. Six members shall constitute a quorum.

*Section 3.* Special meetings may be called by the President whenever he may deem it necessary, or at the request of any three members, in writing. Field meetings and excursions may be held at such time and place as the Academy may direct.

*Section 4.*—The Board of Trustees shall meet on the first Friday in January, April, July, and October in each year, and at such other times as they may be called by the President, or any two members of the Board. Eight members shall constitute a quorum for the transaction of business.

*Section 5.* The Order of Business at regular meetings of the Academy shall be as follows:

1. Reading of Minutes of Last Meeting.
2. Reports of Officers.
3. Reports of Committees.
4. Donations to Museum and Library.
5. Deferred Business, Election of Members, etc.
6. New Business, Proposals for Membership, etc.
7. Written Communications.
8. Verbal Communications.
9. Adjournment.

#### ARTICLE VI.—SPECIAL PROVISIONS.

*Section 1.* In such points of order as are not determined in these By-Laws, the Academy shall be governed by the established usages of

similar institutions; and upon all questions of parliamentary usage, the Manual of Rules of Order, by Lieut.-Col. Henry M. Roberts shall be the standard authority.

*Section 2.* In case of the dissolution of the Academy, a meeting of the regular members shall be called, to decide on the disposition which shall be made of its property.

*Section 3.* No compensation shall be paid to any person whatever, and no expense incurred unless authorized by the Board of Trustees.

*Section 4.* The By-Laws of the Academy may be altered or amended at any regular meeting, by a two-thirds vote, provided that the proposition for such amendment shall have been presented at a previous regular meeting.

#### ARTICLE VII.—SECTIONS.

*Section 1.* Sections of the Academy holding separate meetings may be formed on the written application of five members, by consent of the Trustees.

*Section 2.* The requirements of membership shall be:

1. Membership in the Academy.
2. Written nomination by two members at a regular meeting of the Section.
3. Election by a three-fourths vote of the members present at a subsequent meeting.

*Section 3.* Notice of such proceedings as may be deemed of sufficient interest shall be given by the Secretary at the next regular meeting of the Academy.

*Section 4.* Sections shall have the exclusive right to make additional regulations for perfecting their organization, subject to the approval of the Trustees.

#### ARTICLE VIII.—ENDOWMENT FUND.

*Section 1.* There shall be established a fund to be known and designated as the Endowment Fund, and all money paid into the treasury for life memberships, and all money received from any other source and set apart for that especial purpose, shall constitute a permanent fund, of which the interest only shall be expended.

*Section 2.* The money so put into the treasury from time to time, shall be invested by the Finance Committee, under the direction of the Board of Trustees.

## ARTICLE IX.—PUBLICATIONS.

*Section 1.* The regular publications of the Academy shall consist of Proceedings in octavo, and Memoirs in quarto. The Proceedings shall contain such original papers presented to the Academy and accepted by the Publication Committee as may be conveniently published in octavo form, together with such extracts from the records of the Academy as the Publication Committee may consider of sufficient interest to print. The Memoirs shall contain such papers as, on account of their size and illustrations, can best be published in quarto form.

*Section 2.* The Publication Committee shall fix the price upon the various publications of the Academy at which they shall be sold to members and the general public.

*Section 3.* There shall be established a permanent Publication Fund, the principal of which shall be invested in safe interest-bearing securities, and the interest only used. Any person contributing not less than fifty dollars (\$50.00) to this fund shall be entitled to all volumes of the Proceedings issued thereafter during his life; and any person contributing not less than one hundred dollars (\$100.00) shall be entitled to *all publications* of the Academy issued thereafter during his life.

*March 11, 1887.*—ADJOURNED MEETING.

President C. E. Harrison in the chair.

The subject for discussion was "Clouds—How Sustained in the Atmosphere." The subject was considered in detail, and the phenomena relating to storms in general was discussed.

*March 25, 1887.*—REGULAR MEETING.

President C. E. Harrison in the chair; nine members present.

Librarian reported one hundred seventy-eight additions to the library, including Volumes XV. and XX. of the Tenth Census Report, and two volumes of the scientific writings of Prof. Joseph Henry, former Secretary of the Smithsonian Institution.

Curator reported a number of additions to the museum, including a donation from Rev. J. D. King, of Fall River, Massachusetts, consisting of archæological relics, stone implements, shells of species now extinct, etc.

A communication was received from "*Science*," inviting the Davenport Academy to contribute to the ethnological department of that journal, notes of such work done by its members as would further the

growing interest felt in ethnology, the editor desiring to make a full monthly summary of work of scientific value done in this country.

On motion of Mr. Thompson, the invitation was accepted.

A communication was received from Mr. C. E. Putnam, resigning his position as Corresponding Secretary. The resignation was accepted, to take effect at the next regular meeting; and, on motion of Mr. Thompson, the following resolution was unanimously adopted:

*Resolved*, That in accepting the resignation of Mr. C. E. Putnam, as Corresponding Secretary, we desire to express our regret at the necessity which impels him to withdrawal; and our high appreciation of the valuable services he has rendered in his official relations with the Academy hitherto.

A paper from Prof. F. Starr, of Cedar Rapids, entitled "Bibliography of Iowa Antiquities," was received, and referred to the Publication Committee.

The report of the Committee on Revision of the Constitution and By-Laws was, on motion, taken up and read; the revised Constitution and By-Laws were considered, section by section, and, on motion, adopted.

*April 15, 1887.*—ADJOURNED MEETING.

President C. E. Harrison in the chair; eleven members present.

Mr. George H. French stated the object of the meeting to be the consideration and reply to a circular sent out by the Bureau of Agriculture, in regard to sparrows. It had been sent him by Prof. Barrows, Assistant Ornithologist in the Department, but he preferred, instead of personally responding to it, to bring the matter before the Academy of Sciences for consideration.

The questions propounded in the circular were considered seriatim, and the discussion was participated in by most of those present.

On motion, the Curator was instructed to fill out answers to the questions of the circular, giving the general drift of sentiment in this community in regard to the subject.

*April 29, 1887.*—REGULAR MEETING.

President C. E. Harrison in the chair; sixteen members present.

Librarian reported two hundred nineteen additions to the library during the month.

Curator reported a large number of donations to the museum.

Dr. C. H. Preston was nominated to fill the vacancy caused by the resignation of Mr. C. E. Putnam as Corresponding Secretary, and was elected by acclamation.

A communication was read from the ornithologist of the United States Department of Agriculture, Division of Ornithology, thanking the Curator for valuable information contained in his letter, and in the schedule filled out in regard to the English sparrow. He also expressed a desire to receive any further notes from time to time, which the Academy might collect upon the subject.

The Executive Committee reported that they had considered a proposition from Prof. F. Starr, professor of geology and biology in Coe College, Cedar Rapids, and one of our corresponding members, in regard to observations on the thunder-storms in Iowa. The Professor desired to prepare a report for Iowa, and would prefer that it should be done under the auspices of the Academy. As an immediate reply was necessary, the Executive Committee, at a meeting held April 18th, had accepted the proposal and promised the coöperation of the Academy. The correspondence with the Professor was read and the action of the committee approved.

Dr. Barris then introduced the subject of "Local Geology," basing his remarks on a pamphlet by Mr. A. S. Tiffany, which was filled chiefly with personalities and misrepresentations. Dr. Barris read from standard authorities at hand, showing the inaccuracies of various statements purporting to be scientific, and dwelt upon the fact that personalities were not legitimate criticisms of scientific productions.

The Doctor was asked to reduce his remarks to writing.

*May 13, 1887.*—ADJOURNED MEETING.

President C. E. Harrison in the chair; four members present.

Subject for discussion, "Thunderstorms." The meeting was entirely informal, and all members participated in the discussion.

*May 27, 1887.*—REGULAR MEETING.

President C. E. Harrison in the chair; six members present.

Librarian reported two hundred one additions to the library during the month.

Curator reported that the museum had received remarkable and extensive additions during the month, among which were six barrels, one keg, and seven large boxes of pottery and other relics from Arkansas, collected by Capt. Hall.

Mr. Pratt exhibited the thunder-storm blanks prepared for the use of observers, and reported progress as to this work.

Mr. Carl L. Suksdorf, principal of the German public school, and Mr. B. F. Thomas, editor of the *Morning Sun Herald*, were elected to

regular membership; Mr. L. G. Mason, Oregon, Illinois, was elected corresponding member.

A paper by Mr. R. Ellsworth Call was presented, entitled "Memoranda on a Collection of Fishes from the Ozark Region of Missouri." On motion, it was referred to the Publication Committee.

On motion, adjourned to the Academy grounds to view through the telescope, Jupiter, Venus, Saturn, and the new moon, all of which were in excellent position.

*June 24, 1887.*—REGULAR MEETING.

President C. E. Harrison in the chair; eight members present.

Librarian reported one hundred twenty-nine additions to the library during the month.

Curator reported large donations to the museum. A number of the most noticeable pieces of pottery of the late collection sent by Capt. Hall, and eleven crania, were exhibited.

A communication was read from Prof. Starr showing the thunderstorm work well in hand, with sixty present and eighty prospective observers, the only expense to the Academy being the printing of blanks, etc.

A communication was read from Clark Bell, Esq., President of the New York Medico-Legal Society, offering to send the Quarterly Journal of that society in exchange for the Proceedings of the Academy.

A paper was read from Prof. Starr containing an account of the exploration of four mounds in Floyd county, Iowa, under his immediate supervision. Referred, on motion, to Publication Committee.

Mr. Pratt gave an account of a large number of stone circles, similar to those described by Prof. Starr, inspected by him in Dakota, in localities where no trace of mounds or evidence of human presence, near or remote in time, was discernible.

Some interesting excerpts were read from a paper on "Fresh Water Animals," by Prof. Marshall, of the Manchester (Eng.) Microscopical Society, reciting a series of experiments carried on for the space of three years, which went to show that the differences between several distinct species of marine animals depend simply on the percentage of salt in the water in which they live. They were changed under the eye of the observer back and forth at will, by gradually adding fresh water to the tanks in which they are kept.

Prof. Pratt then brought up for discussion the subject of the "Spectra of Heated Iron."

*July 21, 1887.*—SPECIAL MEETING.

President C. E. Harrison in the chair; thirteen members and several visitors present.

Mr. Harrison stated the object of the meeting to be to take action on the loss which the Academy has sustained in the sudden death of the honored Ex-President, Mr. C. E. Putnam, which it was his painful duty to announce.

On motion, it was voted to meet at the Academy at 2:30 P. M., and attend the funeral services at the Presbyterian Church in a body.

The Secretary was instructed to make such announcement to members through the press and to send postal cards to the absent trustees.

On motion, the following committee was appointed to draft suitable resolutions, viz.: H. C. Fulton, J. H. Harrison, and Dr. McCowen. Committee was instructed to furnish a copy to the press, and to send one to the family.

A motion prevailed that the Academy be closed for thirty days out of respect to the memory of our late Ex-President, Mr. C. E. Putnam.

*August 26, 1887.*—REGULAR MEETING.

President C. E. Harrison in the chair; eleven members present.

The committee on resolutions relating to the death of Mr. C. E. Putnam reported the following resolutions, which were unanimously adopted:

WHEREAS, It has pleased the all-wise Creator of the Universe to remove by death our beloved and valued associate, adviser and friend, Charles E. Putnam, a benefactor of this Academy from its beginning, and late its honored President; therefore,

*Resolved*, That individually and collectively we, the members of the Davenport Academy of Natural Sciences, deeply feel the loss which has so heavily fallen upon us, as well as upon this entire community with which he has for so many years been prominently and honorably identified.

*Resolved*, That remembering his uniform and untiring efforts in behalf of this Academy, as well as in the interests of science in general, we will ever revere his memory and lovingly associate his name with those of Sheldon, Farquharson, and of his own gifted and lamented son, J. Duncan Putnam, who, having also served this Academy in its highest official station, have rested from their labors.

*Resolved*, That we extend to the bereaved widow and children, the tenderest and truest sympathy.

*Resolved*, That these expressions be spread upon the records of the Academy.

Signed, H. C. FULTON.  
JENNIE MCCOWEN.  
J. H. HARRISON.

After appropriate remarks by several of the members present, the regular order of business was taken up.

The Librarian reported three hundred five additions to the library since June.

The Curator reported large donations to the museum, of shells, fossils and curiosities of various kinds, and some of great scientific interest.

Mr. Pilsbry presented fifty mounted and labeled microscopic slides, showing the anatomy of the mollusk. Also, several hundred fishes of local species, being part of a collection which he, in connection with J. E. Elliott, of Rock Island, is making for the Academy.

The Publication Committee, through Dr. Preston, reported Volume V. well on the way, one-fourth of the matter being already in the hands of the printer, and enough to complete the volume waiting to be edited.

Two corresponding members were elected: Rev. Thomas L. Young and L. A. Cox.

A communication was read from Dr. Githins, Hamilton, Illinois, describing a worm-like creature thrown up by an artesian well at the Sanitarium at that place.

Edison's "Pyro-magnetic Generator" was then discussed. Mr. Pratt gave an account of the experiments leading up to this new discovery, and of the apparatus used. Much interest was manifested in the results which may be expected to result from this discovery.

The Academy then adjourned to examine Mr. Pilsbry's microscopical slides.

*October 7, 1887.*—ADJOURNED MEETING.

President C. E. Harrison in the chair; nine members present.

Librarian reported one hundred sixty-seven additions to the library.

Curator reported large number of donations to the museum.

The committee appointed to nominate a successor to the late Charles E. Putnam, as Trustee, reported the name of Mr. W. C. Putnam, who was unanimously elected.

A communication was read from the Humboldt Science Club, about to adjourn indefinitely owing to the departure from the city of a majority of its members, thanking the Academy for the use of the rooms, and for kindness and past favors. On motion of Dr. Preston, the vote of thanks was accepted and ordered to be recorded.

Lavinus W. Petersen, Jr., was elected to regular membership.

The death of Walker Adams was reported to the Academy, and a committee was appointed to draw up suitable resolutions.

*October 28, 1887.*—REGULAR MEETING.

President C. E. Harrison in the chair; nine members present.

Librarian reported one hundred thirty-five additions to the library.

Curator reported receipt of another box from Capt. Hall, containing one hundred thirty-one flint and stone implements and a few fossils,

A communication was read from Dr. Max Uhle, of Dresden, acknowledging the receipt of photographs sent him, and congratulating the Academy on the fact (which he had learned from scientific sources outside the Academy) that the opposition to the genuineness of the Academy relics had been, for the most part, abandoned.

W. H. Pratt, James Thompson, and Dr. McCowen, the committee on resolutions in regard to the death of Mr. Walker Adams, a life member of the Academy, reported the following resolutions, which were unanimously adopted:

WHEREAS, In view of the sad event which has recently stricken from the list of life members the name of Walker Adams,

*Resolved*, That in his departure from the scenes of busy life, the Academy sincerely mourns the loss of one of its life members and benefactors; and

*Resolved*, That we deeply sympathize with his family and friends in their great loss; and

*Resolved*, That a copy of these resolutions be spread upon the records of the Academy.

*December 2, 1887.*—ADJOURNED MEETING.

President C. E. Harrison in the chair; fourteen members present.

Librarian reported one hundred seventy-five additions to the library within the month.

Final report of Prof. Starr on "Thunderstorms in Iowa," was presented and on motion referred to the Publication Committee.

On motion, a committee consisting of Prof. Pratt, Dr. Preston, and H. C. Fulton, was appointed to formulate a plan for continuing the Thunderstorm reports.

It was reported that Prof. Starr's interesting and instructive costume lecture on the "Indians of Iowa" was given at the Presbyterian church under the auspices of the Academy, according to announcement.

A circular communication was received from the New York Academy of Science, asking coöperation in placing a monument over the grave of Audubon.

*December 16, 1887.*—ADJOURNED MEETING.

President C. E. Harrison in the chair; ten members present.

A paper by Mr. Charles R. Keyes, of Burlington, "An Annotated List of the Birds of Iowa," was read by title, and on motion referred to the Publication Committee.

Dr. Allen then gave an address on the "Vertebral System in Man and Animals," which was listened to with great interest.

On motion, a vote of thanks was tendered to Dr. Allen.

A box from Mr. George F. Daniels, of Oxford, Massachusetts, was then opened, and found to contain a large collection of ancient implements, household utensils, old china, etc.

*January 4, 1888.*—ANNUAL MEETING.

President C. E. Harrison in the chair; twenty-three members present.

The reports of the officers were presented, as follows:

## RECORDING SECRETARY'S REPORT.—ABSTRACT.

Seventeen meetings have been held during the year, with an average attendance of fifteen. Seven regular and five corresponding members have been elected, making a total gain of twelve during the year. Three life members, one regular member, and one corresponding member has died, making a total loss of five. Present membership—life members, 77; regular members, 120.

Papers of scientific value read before the Academy: "Bibliography of Iowa Antiquities;" "Report on Thunder-Storms of Iowa;" "Fishes of the Ozark Mountains;" "Annotated List of the Birds of Iowa;" "Anglo-Saxon and Latin Words."

Subjects of more or less general interest discussed: "Clouds, How Sustained in the Atmosphere;" "Theories of Thunder and Lightning;" "The Stone Circles on Dakota Plains;" English Sparrows;" "Theory of Color;" "Changes in Animal Life Caused by Salt or Fresh Water;" "Edison's Pyro-Magnetic Generator."

Lectures: "The Vertebral System in Man and Animals;" and a costume lecture under the auspices of the Academy, "The Indians of Iowa."

Other societies holding meetings in the Academy building: Scott County Medical Society; Iowa and Illinois District Medical Society; Scott County Horticultural Society; Davenport Pharmaceutical Association; and two chapters of the Agassiz Association.

Number of visitors during the year, about two thousand.

JENNIE McCOWEN, M. D., *Recording Secretary.*

## LIBRARIAN'S REPORT.—ABSTRACT.

The total number of additions to the library registered during the past year, exclusive of city papers, is 2,025. These comprise the transactions and reports of about one hundred scientific and historical societies in the United States and Canada, and one hundred and fifty foreign societies; the United States government publications, scientific, historical, and statistical, of eighteen of the several departments at Washington, received regularly; the geological survey reports of fourteen states, and the agricultural, historical, statistical, health, and other publications of nearly all the states, and a large number of miscellaneous scientific works. Of periodicals received regularly, there are eleven weeklies, one semi-monthly, seventeen monthlies, one bi-monthly, and four quarterlies. Of many of these we have complete files.

The library now contains—bound volumes, 1,730; unbound volumes and pamphlets, 4,600; miscellaneous scientific papers, 775.

A reading table is kept furnished with the publications recently received, which, as well as those on the shelves, are consulted during the open hours of the Academy almost every day; and citizens of nearly every nationality can find here valuable scientific works printed in their own native tongues.

The especial needs of the library are: a considerable increase of shelf-room; the binding of several hundred volumes; a lot of pamphlet cases; the completion of a subject catalogue, which is begun, and a fund for the purchase of such important works as are especially needed and cannot be obtained (as almost the whole library is, and always has been) by exchange for our "Proceedings." As the Academy is in no way a money-making institution, it is to be hoped that some public-spirited citizens will aid in providing for its needs.

HARRY A. PILSBRY, *Librarian*.

## TREASURER'S REPORT.

The Treasurer's report was presented by W. H. Pratt, Deputy Treasurer, as follows:

## GENERAL FUND.

*Receipts.*

Amount from former Treasurer .....	\$ 19 34	
Annual dues for 1887 .....	270 00	
"    "    " 1888 .....	3 00	
"    "    " arrears .....	51 00	
"    subscriptions for 1887 .....	423 00	
Membership fees (seven new members) .....	35 00	
Contributions .....	28 01	
Interest on Endowment Fund .....	89 55	
"    " Mound Fund .....	55	
"    temporary deposit .....	76	
For use of rooms .....	12 50	
Borrowed at National Bank .....	650 00	
Mrs. Newcomb's share of sewer bill .....	11 20	
Prof. Starr's lecture .....	13 05	\$1,606 96

*Expenditures.*

Amount paid Curator.....	\$451 66
" " janitor.....	60 00
Fuel.....	50 25
Gas.....	24 75
Water.....	16 00
Express and freight.....	46 64
Postage, supplies, and incidentals.....	86 36
Prof. Starr's lecture.....	10 75
Subscription to "Science".....	5 00
Old note, taken up.....	250 00
Old bills and accounts paid, per vouchers.....	398 09
Paid on new note.....	200 00
Balance on hand.....	7 46—\$1,606 96

## ENDOWMENT FUND.

Loaned on Mortgage, at eight per cent.....	\$1,000 00
Deposit in Scott County Savings Bank at five per cent....	191 77—\$1,191 77

## SPECIAL MOUND FUND.

Deposit in Scott County Savings Bank.....	\$11 00
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## PRESENT INDEBTEDNESS.

Note to Mrs. Newcomb, at eight per cent.....	\$320 00
Note to Davenport National Bank, at seven per cent.....	450 00
Balance due Curator.....	48 34
Unpaid bills.....	10 00—\$828 34

Thus it will be seen that the balance of accruing interest is \$33.00 per annum in favor of the Academy.

Probable collectible dues, \$36.00.

The total current expenses for 1887 were \$795.15.

NICHOLAS KUHNEN, *Treasurer.*

## CURATOR'S REPORT.

In the Museum department, the accessions during the past year comprise the following: About three hundred vessels of ancient mound pottery; two hundred flint and stone implements; eleven human crania, from mounds; one carved stone Indian pipe; two hundred and thirty-five old-time relics from New England; an old electrical machine; twenty-five species of fossils; several hundred species of recent shells.

No additional cabinet cases have been supplied, and the need of them is extremely pressing. By the addition of four cases of the usual form, the alcove arrangement of the west room of the basement could be completed, and the whole room made available as a part of the museum; and some reasonable hope is entertained that this will soon be done.

The collection of recent shells, which has been very largely increased by the labors of Mr. Harry A. Pilsbry, has been rearranged, and extended to occupy two additional cases, and a catalogue of them nearly completed—about twenty-five hundred species.

A considerable number of the local species of fishes and reptiles has been collected and preserved, and during the ensuing year it is be-

lieved that considerable progress can be made toward making up an approximately complete collection. In gathering these and other natural history specimens, our young friends of the Agassiz Associations may be depended upon for considerable aid, and if their pursuit of the study should develop a competent taxidermist it would certainly supply a long-felt need.

Nothing has been done during the year in mound explorations in the interest of the Academy, except that prosecuted by Captain Hall along the Lower Mississippi, the collections from which have been added to the Academy museum and are referred to in the above enumeration. There remains plenty of that work to do within the range of fifty to seventy-five miles of us; but for that purpose some money is required, and it is only upon occasions not very frequent that the means can be secured. This work is, for us, of the utmost importance, in order to maintain our reputation for activity and perseverance, as well as for the actual knowledge to be gained.

For a better classification and arrangement in some departments—especially the minerals—a great improvement could be made, and some valuable space saved, if it were possible to remove restrictions requiring the individual collections to be kept as such. Instead of this, the specimens could then be better classified, and space in cabinets need not be taken up by duplicates.

I would not recommend that the increase of our museum greatly beyond its present extent should be a principal object, except, first, completed local collections, and, second, systematic, classified series in the various departments adapted especially for study, and kept for reference and use by members and by classes from the public schools, but not to be taken from the building.

W. H. PRATT, *Curator*.

#### REPORT OF PUBLICATION COMMITTEE.

Volume V. of the Academy Proceedings was commenced, and a few pages printed, in 1886, as stated in last annual report. During the early months of the past year, all effort was directed toward raising a fund to secure the current expenses of the Academy; and later, the dark shadow of death in our midst sadly interrupted the work of the Committee, so that the printing of the volume was still delayed, and no subscriptions received until late in November. Nevertheless, all expense thus far incurred has been met, save a loan of one hundred dollars, without interest, which was kindly offered for the completion of Volume IV., and which the Committee assumed the responsibility of accepting. To carry on the work, it is important that members and others should promptly hand in their subscriptions.

Funds to provide a suitable portrait of the late Prof. D. S. Sheldon have been secured through the generosity of his former pupils and friends, and a biographical sketch is in process of preparation, and both will appear in Volume V.

Many valuable papers intended for this volume have been received during the year, of which the following—filling sixty-four pages—have been printed:

"On Certain Recent Quaternary and New Fresh-Water Mollusca." By R. Ellsworth Call; 8 pp., 1 plate, 3 cuts.

"On Pyrgulopsis, a New Genus of Rissoid Mollusks, with Description of Two New Forms." By R. Ellsworth Call and Harry A. Pilsbry; 6 pp., 1 plate, 1 cut.

"A Defense of Our Local Geology" (a criticism of Mr. Tiffany's pamphlet). By W. H. Barris; 8 pp.

"Volcanoes of the Sandwich Islands." By C. S. Watkins; 6 pp.

"An Ancient Mine in Arkansas." By W. A. Chapman; 4 pp.

"Description of a New Hydrobia, with Notes on Other Rissoidæ." By Harry A. Pilsbry; 2 pp., 1 plate.

"Iastaria (Remy) Confirmation of the Genus, with Character Extended." By C. C. Parry; 2 pp.

"Mound Exploration at Toolesboro, Louisa County, Iowa." By Messrs. Lynch, Fulton, Harrison, and Preston; 6 pp.

"Additional Explorations at Toolesboro." By C. E. Harrison and W. H. Pratt; 2 pp.

"Contributions to the Mollusca of Florida." By C. T. Simpson; about 25 pp., one-half printed.

"Memoranda on Some Fishes of the Ozark Region of Missouri." By R. Ellsworth Call; 8 pp.

Other papers in the hands of the Committee are as follows:

"A Report on Thunder-Storms of Iowa, Season of 1887." By Frederick Starr.

"Annotated List of Iowa Birds." By Chas. R. Keyes.

"Description of Four New Species of Myriapods from the United States." By Jerome McNeil; 2 pp.

"Ancient Grooved Rocks." By Wm. A. Chapman; 2 pp., 1 cut.

"Contributions to the Knowledge of the Devonian Fauna of Iowa, with a Description to the Rockford Shales." By Clement L. Webster; about 10 pp., 1 map, 1 cut.

"Mound Explorations in North-Western Iowa." By F. Starr.

These will be sufficient for Part I., of one hundred and fifty pages. It is our purpose to include in the second part of this volume the revised constitution and by-laws, list of members, and lists of donations; also a complete index to the entire proceedings to date; Prof. W. J. McGee, of the United States Geological Survey, having kindly offered to prepare the latter as soon as the work is ready. It will also contain a condensed report of the proceedings of meetings.

MRS. M. L. D. PUTNAM,

C. C. PARRY,

W. H. BARRIS,

C. H. PRESTON,

JAMES THOMPSON,

*Committee.*

## PRESIDENT'S ANNUAL ADDRESS.

BY CHARLES E. HARRISON.

LADIES AND GENTLEMEN:

In surrendering the trust which in generous confidence you assigned me, I shall not be expected to offer any scientific discourse, neither will I undertake any apology for such shortcomings as could have been prevented only by elevating some abler member to this honorable office. The credit of whatever success may seem to have attended the direction of affairs, is due to the officers and members who have willingly assisted and advised, and for whose constant support, as well as forbearance, I am sincerely thankful.

The twentieth year of our existence, just rounded to a close, may be said to have been one of "even tenor," less fruitful, perhaps, of perceptible results than some preceding ones, but yet, I trust, a year in which we who remain have lost none of our interest in the grand work of seeking after truth for truth's sake—a year in which no retrogressive step has been taken, and which, notwithstanding the full quota of discouragements which it has witnessed, leaves us, I dare say, to-night, strong and determined to continue the good work which, springing up from the little seed so opportunely planted just twenty years ago, has continued to flourish and grow, and which, with increased possibilities as well as responsibilities, devolves now upon us as faithful members. To have thus long survived the various vicissitudes which have beset us, while a number of scientific associations in this and adjoining states have been organized and, after a short existence have ceased to be, is of itself an encouraging measure of success; and this result, which, though in no spirit of boasting, we may view with some just pride, is magnified when we consider that, notwithstanding adverse circumstances—particularly a constant lack of sufficient means to properly prosecute our work—the institution has steadily gained in popularity and strength, and to-day, owning the valuable premises it occupies, is enabled to keep its rooms open to the public, maintains the publication of its proceedings, and is building up in this accessible western city a scientific museum and library which must be, if properly sustained and wisely managed, a factor of much importance in the great scheme of educational progress.

That there is cause for anxiety for the future is true; for, except about \$90 interest accruing from the nucleus of an endowment fund, a special annual subscription fund of \$425 (limited to five years), and the meager receipts from dues and fees, say \$350—a total of less than \$900, or about sufficient to pay running expenses—the Academy is without funds for the purchase of such needed books, periodicals, and monographs as cannot be obtained by exchange and otherwise for the prosecution of its work. And then, as the years come and go, we are being rapidly deprived of our faithful workers and substantial supporters. New members are recruited from time to time, but these are not numerous; and have they, and have we, that zeal and efficiency which, added to lofty purpose, is essential to continued success? The Acad-

emy may be hereafter, as heretofore, hindered by lack of funds, and thus restrained may even bide its time until some philanthropist enables it to occupy a yet higher plane of usefulness. But we need, and must have, diligent workers, investigators, delving in the fruitful fields of scientific research, and seeking to know more of nature and of nature's laws. We may be glad that there is established in our midst two vigorous chapters of the Agassiz Association, comprising a goodly number of boys and girls ardently interested in and studying the various branches of natural science. This is a body of noble youth bending the young intellect into the pleasant and important paths of scientific inquiry, and whose very purpose is to us a halo of promise, gilding the Academy's future sky with a radiance of hope.

A very full condensed account of the year's transactions appears in detail in the several reports which have been read in your hearing, but some matters in connection therewith may claim especial attention.

The printing of Volume V. having been resumed and sixty-four pages issued from the press, it is highly desirable that the work be pushed forward, especially as there is already in hand sufficient material to complete the first part. To do this, we must largely rely upon the support of our own members, less than twenty of whom have as yet subscribed for copies. If each member would order one copy—certainly not a heavy burden—the completion of the book would be assured. The volume, in addition to proceedings and scientific papers, will be adorned with an excellent portrait and biographical sketch of our lamented fellow-member, Prof. D. S. Sheldon, the honored first President of the Academy, the expense of the plate being met by his former pupils and friends. Prof. W. J. McGee, of the United States Geological Survey, has kindly offered to prepare a complete index when the volume is ready, a work involving no inconsiderable amount of labor and skill.

The collections in the museum show large additions during the year, and the classification and arrangement of these accumulations, while giving much and very proper employment to our excellent Curator, has taxed his ingenuity as well, because of the insufficient accommodations and already crowded condition of the cases. The constant necessity for increase of room and greater facilities in the museum department, which has obtained and burdened the Academy for several years at least, seems to "grow with its growth," and current wants are scarcely, if at all, supplied till others appear. Nevertheless, the condition referred to is by no means cause for complaint. Such increase in either of its departments is, as a result, a legitimate part of the Academy's successful work, and the provision of a suitable depository for every specimen received is not only a necessity, but an imperative duty, which must be bravely met. The excellent suggestion of the Curator, viz.: the construction of four additional cases uniform with those now in place in the west basement room, to complete the alcove arrangement already begun, and thus render that commodious apartment wholly available for museum purposes, is worthy of adoption as affording much needed relief and of proper effort to provide the means for its execution.

The Librarian's report is encouraging as exhibiting no diminution in

the steady growth which has heretofore characterized this highly important department of the Academy. The addition during the year of more than two thousand publications comprising the transactions of most, if not all, the important scientific and historical societies of the world, the individual contributions to science of many eminent *savants* of the day, and a vast deal of other matter relating to scientific research or reflecting scientific thought, is surely a grand showing. And this single item is important to the good people of this community as indicating not only the vast value of the literary treasures already in store, but also the probable growth, and consequently the increasing worth, of the Academy's library. Here, too, as in the museum department, already alluded to, there is pressing want. These books and pamphlets, gleaming and glittering with living thought, cry out for proper place and proper protection. More shelf-room is needed; binding is needed; a complete index is needed; and in view of the scantiness of our treasury and other proper demands made upon it, one of the problems which now confronts us is how to supply these wants.

Let not the erroneous idea prevail that this great library and museum are for the exclusive use and benefit of our members. Both are available to the public, daily, during "open hours," and both are being consulted and examined almost constantly, often by pilgrims coming from afar for the express purpose. Surely, in this enlightened and progressive city, agencies of such vast educational utility and worth, of such widespread and far-reaching benefits to the entire public, and capable of maintenance at such comparatively little cost, cannot long await the day of fuller appreciation when the number of our good people whose names are enrolled as members of the Academy shall be far greater than at present.

The finances, while not in that flush condition desirable and necessary to greater accomplishments, and while yet comparing favorably with the condition of affairs at any annual meeting of recent years, is a subject of considerable concern inasmuch as this department of necessity underlies every other, and is of vital importance as affecting the progress and success of the Academy, or possibly its very existence. It has been necessary during the year to borrow the sum of \$650; but when we consider that previous indebtedness amounting to \$850 has been paid, there is no cause for discouragement in the item. The interest accruing from our investments is more than sufficient to pay for the use of this borrowed money, the difference in our favor being about \$33. Still, it is desirable that the Academy be freed from debt, and this it is hoped to speedily accomplish by continuing the practice of strict economy and prudent management.

Having referred to the status and wants of the several departments as separate matters pertaining to the progress and condition of the Academy, I come now, with sad heart, to speak of the honored dead—of those strong helpers and fellow-workers whose labors and aid have left a lasting impress upon, or added additional lustre to, the good name of this beneficent institution. During the year, death has deprived us of three life-members, Charles E. Putnam, Walker Adams, and A. F.

Williams; one regular member, August Warnebold; and one honorary member, Prof. Spencer F. Baird. These were honored names upon the roll, and their several deaths within the period of one short year make up a total loss of crushing weight. Who of the large audience that sat in this room just twelve months ago and listened to the masterly address of the retiring President, Charles E. Patnam, could have dreamed that death would come so soon to him, the useful and respected citizen, the man of large attainments and noble purposes, the benefactor and defender of this Academy, who had so long and so liberally contributed of mind and means to its support and upbuilding, whose wise counsels and executive ability served us so ably and well through the two terms of his administration, and whose loss to the society, as well as to the entire community, is irreparable indeed. Because of his unswerving fidelity to this institution, his earnest solicitude for its success, and active interest in all that pertained to its affairs, and his known generous disposition and willingness to render assistance, it must be true that the inefficiency of his official successor would have been greatly lessened but for his untimely end. But, fellow-members, though we are weakened, saddened, and discouraged by the loss of these good men, we must not sit idly down to brood over the inexplicable dispensation of Providence.

The history of our twenty years experience in meeting and mastering obstacles, should inspire us anew with confidence, energy, and zeal. The grand work which has been brought thus far at measureless cost of solicitude and labor, and consecrated by the best efforts of the younger and elder Putnams, of Sheldon, Farquharson and others, is worthy of perpetuation. In the world's great struggle for universal education, and development of mind, the field for such beneficent institutions as this is ample and wide, and I trust the day is not far distant when every good public-spirited citizen—whatever his financial status or scientific attainment—charged with the electric spark of pure philanthropy, shall rally to the support of this great instrument for the diffusion of knowledge, that this fair young metropolis throned upon the commanding bluffs of our own majestic river, boasting of every element of commercial dignity and greatness, boasting of her temples, colleges, and schools, may point with exultant pride to an enlarged, commodious and imposing building towering high upon this the sunniest spot of her southern slope—a building which shall be at once a monument to the enterprise, intelligence, and goodness of her people, a proper home for the Davenport Academy of Natural Sciences, and with its accumulated treasures a benefaction and precious heritage to generations yet unborn.

The presentation of these reports was followed by the election of officers for the ensuing year, resulting as follows:

*President*—CHARLES E. HARRISON.

*First Vice-President*—JOHN B. PHELPS.

*Second Vice-President*—DR. L. FRENCH.

*Recording Secretary*—DR. JENNIE McCOWEN.

*Corresponding Secretary*—MISS LUCY M. PRATT.

*Treasurer*—CHARLES D. GLASS.

*Librarian*—H. C. FULTON.

*Curator*—W. H. PRATT.

*Trustees for Three Years*—W. H. HOLMES, WILLIAM RIEPE, E. H. HAZEN, W. H. PRATT.

C. R. Keyes was elected corresponding member.

The following resolutions, offered by Mr. Pratt, were presented, and unanimously adopted:

WHEREAS, We are informed, by notice from the Smithsonian Institution, that the vacancy caused by the decease of the late lamented Secretary of that Institution, Prof. Spencer F. Baird, has been filled by the appointment of Prof. Samuel P. Langley to that position.

*Resolved*, That we are highly gratified to learn that a gentleman of such acknowledged talent, eminent scientific attainments, and executive ability, and high character, has thus been selected for the important position of superintendent of the management of this, one of the leading scientific institutions of the world; and

*Resolved*, That we desire hereby to express our hope and full confidence that the uniformly pleasant and friendly relations which we have enjoyed for the past twenty years with his learned predecessors, Professors Henry and Baird, may continue undiminished between us and the new Secretary through many coming years; and

*Resolved*, That we take pleasure in hereby tendering to Prof. Langley the honorary membership in our institution heretofore held by the former secretaries.

*January 10, 1888.*—TRUSTEES' MEETING.

President C. E. Harrison in the chair; nine members present.

On motion, it was voted that a committee of three be appointed to devise plans to increase the interest in the meetings of the Academy and the efficiency of its work in general, to report to the Academy as progress is made. The chair appointed Dr. Jennie McCowen, W. H. Holmes, and W. H. Pratt such committee.

On motion, it was voted to continue the services of Mr. W. H. Pratt as Curator, at \$500 per annum.

*January 28, 1888.*—REGULAR MEETING.

President C. E. Harrison in the chair; six members and several visitors present.

Librarian reported one hundred forty-eight additions to the library.

Curator called attention to a very valuable report on "Cattle and Dairy Farming," among the consular reports now out of print. On motion, it was voted that W. H. Holmes and W. H. Pratt be a committee to prepare a suitable resolution to forward to Washington, asking for another edition to be printed.

The committee from the Board of Trustees to devise plans for increasing the interest in Academy work, asked leave to report as follows:

1. That it be determined and announced that, in addition to the regular monthly meetings provided for by the By-Laws, the Academy will be opened and a meeting will be held every Friday evening, and that all members be requested and the public invited to attend at all meetings, and that provision be made, as often as possible, for a lecture or paper and discussion on some subject of scientific or general interest. Also, that when no subject is announced, those who are present take up some subject, by reading published articles or otherwise, for regular discussion, and furnish the papers with a report of the meeting.
2. That printed cards of notice of meetings be filled out and distributed to members inviting them to be present.
3. That the teachers of the public schools be invited to bring their classes to the Academy when practicable— notifying the Curator a day or two in advance — and that some member explain to the children some class of specimens in the museum; and that the teachers throughout the county be included in this arrangement.
4. That a systematic and persistent effort be made by canvassing the city, members, and non-members, to secure lectures and scientific papers for our meetings, so as to have a reliable list prepared.
5. That all members be urged to endeavor to interest their friends and bring in new members; and also to attend and induce their friends to attend the meetings.

Report was received and committee discharged.

*February 24, 1888.*—REGULAR MEETING.

President C. E. Harrison in the chair.

A communication was read from the Peoria Scientific Association, sending greetings and newspaper notices of their Annual Meeting; also, from Jefferson County Library Association, sending an account of their annual meeting. The Secretary was instructed to exchange friendly greeting with both these societies.

The subject of "Meteors" was then discussed, and the specimens in the Academy museum displayed and their history given by the Curator.

The President announced the death of two honorary members of the Academy, Dr. Asa Gray, who died January 30, and Prof. George W. Tryon, February 5, 1888.

Adjourned to reorganize the Historical Section.

*March 2, 1888.*—ADJOURNED MEETING.

President C. E. Harrison in the chair; eleven members and a number of visitors present.

Librarian reported one hundred twenty-six additions to the library.

Curator reported valuable donation to the museum of a collection of marine specimens from Prof. B. Shimek, of Iowa City; alcoholic, twenty-eight species; dry, twenty-three species.

Mrs. Lucy E. Harrison was duly elected a regular member of the Academy.

The Historical Section was reported to be not yet regularly organized, but committees have been appointed to take the necessary steps. The Section desires the coöperation of the Academy in arranging to celebrate, with other historical societies, the anniversary of Marquette's discovery of the Mississippi River. The committee reported progress in the preparation of a programme.

The subject for discussion, "Volapuk," was then taken up. No paper was presented, but an informal discussion was participated in by most of those present. It was voted to continue the subject to a subsequent meeting.

*March 30, 1888.*—REGULAR MEETING.

President C. E. Harrison in the chair; eight members present.

Librarian reported two hundred twenty-three additions to the library.

The Treasurer reported the collection by Mrs. Putnam:

Annual Subscriptions.....	\$402 00
Annual Dues .....	70 00
	<hr/>
	\$472 00
Paid to Treasurer.....	\$ 60 00
" " Curator.....	148 00
" Coal Bills.....	36 00
" Egbert & Co.....	50 00
" Note in Bank.....	100 00
	<hr/>
	\$394 00
Collected on Publication Fund.....	\$ 36 00

Mr. Frank Nadler was elected a regular member of the Academy.

On motion, it was voted to announce the Academy open every Friday evening. The attendance of members is requested and friends are invited.

Adjourned to Historical Section.

*May 25, 1888.*—REGULAR MEETING.

President C. E. Harrison in the chair; eleven members present.

Committee on the Marquette Celebration reported progress.

Librarian reported three hundred twenty-seven additions to the library.

A communication received from General Greeley, of the United States Signal Service, was read, offering to coöperate in gathering thunder-storm data. He will furnish blanks and franked envelopes. Two hundred fifty circulars have been sent out this year, and eighty observers are already enrolled. Great encouragement is felt at the interest of General Greeley in our efforts.

The most notable donations during the month have been a box of fossils from Judge Wakefield, Sioux City, and a large section of a tusk of the mastodon, six and one-half inches in diameter, weighing thirty pounds, which Mr. Chris. Benedix brought from California for the Academy. A vote of thanks was tendered to Mr. Benedix. The mastodon and the mammoth were compared and discussed.

A paper by Prof. C. L. Berthoud, Golden, Colorado, on "The Occurrence of Buddhistic Emblems in the collections of the National Museum," was read and referred to Publication Committee.

*June 29, 1888.*—REGULAR MEETING.

President C. E. Harrison in the chair; five members present.

Mr. Fulton, from the committee on the Marquette Celebration, reported a public meeting of great interest, with a varied programme, Mr. DeArmond giving the Historical address. On motion of Mr. Fulton, a vote of thanks was tendered Mrs. Forrest, who sang, and Miss Nichols, who accompanied her on the piano, for adding so greatly to the pleasure of the entertainment.

William F. Greenlee, Belle Plaine, Iowa, was elected to corresponding membership.

The President announced the death of two corresponding members: Prof. A. H. Worthen died May 6, and Prof. W. D. Gunning died March 8; also, Mr. J. J. Dahms, a regular member, who died April 16.

The subject, "A New way of Finding the Foci of an Ellipse," was then discussed, illustrated by original and ingenious drawings and apparatus.

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*June 8, 1888.*—SPECIAL MEETING.

President C. E. Harrison in the chair; fifteen members present.

The President stated the object of the meeting to be, to meet Mr. W. J. McGee, of the United States Geological Survey at Washington, D. C.

After some informal talk, Prof. McGee was invited to address the meeting, and in compliance with the request he gave a very interesting address, discussing at some length the status and needs of our Academy, and the condition of scientific institutions generally in the West.

The Academy then adjourned, and some further time was spent in informal conversation.

*July 9, 1888.*—ADJOURNED TRUSTEES' MEETING.

President C. E. Harrison in the chair; eight members present.

President stated that the principal subject for consideration for this meeting was the financial condition of the Academy and the means to be adopted for provision of funds to meet expenses.

After considerable discussion regarding entertainments, lectures, etc., Dr. Preston moved the appointment of a committee consisting of Messrs. Fulton, Pratt, and Hazen, to ascertain the feasibility of the above matters, and to report at an adjourned meeting.

*July 19, 1888.*—ADJOURNED TRUSTEES' MEETING.

President C. E. Harrison in the chair; nine members present.

Report of the special committee read, and, on motion, amended and adopted, as follows:

TO THE TRUSTEES OF THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

Your special committee, appointed July 9, 1888, would respectfully report and recommend—

1. That an admission fee to the Academy building, of ten cents, be charged, members and children under ten years of age being admitted free.

2. That a course of ten home lectures be given in the Academy during October, November, December, January and February next, and that there be charged an admission fee of fifteen cents, or one dollar for a ticket admitting to the entire course.

3. That an effort be made to increase the usefulness of the Academy, and to that end, that special studies of the different departments be provided for at stated times.

4. That an entertainment be given on the twenty-first anniversary of the Academy's birth, December 14th.

Respectfully submitted,

H. C. FULTON,  
W. H. PRATT,  
E. H. HAZEN.

On motion, the President appointed H. C. Fulton, Dr. McCowen, and W. H. Pratt a committee to carry out the above Home Lecture Course, and such other lectures as may be secured.

On motion of Mr. Fulton, a committee consisting of Drs. Preston and Hazen, and William Riepe, with the Curator as chairman, was appointed to carry out the plan of the third recommendation.

The President stated that parties from Le Claire were desirous of obtaining two lots in that city owned by the Academy. After discussion, Messrs. Harrison and Fulton were appointed a committee with power to act in the matter.

*August 31, 1888.*—REGULAR MEETING.

President C. E. Harrison in the chair; six members present.

Librarian reported three hundred eighty-seven additions to the library.

Curator reported numerous and valuable additions to the museum.

Dr. P. R. Hoy, of Racine, Wisconsin, was elected as corresponding member.

Committee on ways and means reported the recommendations which had been adopted by the Board of Trustees.

Specimens of zinc ore from the Cook quarry, also clay, fossils, and shells collected by Prof. Pratt, were exhibited. Some discussion ensued on the nature of the recent finds in that locality, and the small probability of their value from a commercial point of view.

The Curator called attention to some of the untenable theories upon which the De Bausset air-ship is planned, for the construction of which Congress is asked to make an appropriation of \$75,000 and authorize the use of one of the government navy-yards for the building of the machine. An extended discussion followed, participated in by most of those present.

*September 24, 1888.*—TRUSTEES' MEETING.

President C. E. Harrison in the chair; nine members present.

Special meeting of the Trustees convened at Dr. Preston's office to take action on a communication received from Charles R. Keyes, of Burlington, in regard to the publication of his paper on "The Birds of Iowa."

On motion of Mr. Fulton, it was voted "That it is the sense of the Trustees, that the paper by Mr. Keyes, on 'The Birds of Iowa,' be published as soon as possible."

Dr. Hazen presented to the Trustees a Spectacular Drama which he had prepared, as suitable, perhaps, for the anniversary meeting.

The President reported that the property of the Academy in Le Claire had been sold for \$25.00.

On motion of Mr. Pratt, it was voted to place the amount to the credit of the Publication Fund.

Mr. Fulton, on behalf of the Lecture Committee, reported encouraging progress in securing local speakers and arranging topics and dates.

On motion of Mr. Pratt, it was voted to give complimentary tickets to the course to the members of the Agassiz Chapters of the city.

*September 28, 1888.*—REGULAR MEETING.

President C. E. Harrison in the chair; nine members present.

Additions to the library, one hundred twenty-seven. Library Committee reported four hundred feet of additional shelving put up during the month, making room for four thousand more books and pamphlets.

The Museum Committee reported that they had secured the promise of the necessary four cases to complete the alcove arrangement of the basement, which would provide a very desirable and necessary addition to the available space for displaying the collection.

The feasibility of cutting and polishing specimens in the Academy was discussed and laid over for further information as to necessary fixtures, expenses, etc.

*October 13, 1888.*—SPECIAL MEETING.

Special meeting convened at the office of Dr. Preston to take action in relation to the decease of the Hon. George H. French, one of our life members.

President C. E. Harrison in the chair; eleven members present.

The President stated the object for which the meeting was called, and in pursuance of this object, he appointed a committee on resolutions consisting of James Thompson, Dr. C. H. Preston, and Major G. P. McClelland.

On behalf of the committee, Mr. Thompson presented the following resolutions, which were unanimously adopted:

WHEREAS, Amid the changes of human life, our esteemed and respected fellow-citizen, the Hon. George H. French, has closed his earthly career and left the scenes of his usefulness here in the full strength of his manhood forever; and

WHEREAS, In his departure from among us, the Academy has lost one of its oldest Trustees and most efficient life members and benefactors; therefore be it

*Resolved*, That we mourn his loss not only as a fellow member, who in times of need aided the Academy by his influence, voice, and purse, but also as a citizen who was ever foremost in all that pertained to the intellectual, moral, and material welfare of the city.

*Resolved*, That these resolutions be entered in the minutes of the Academy, and that a copy be furnished for publication in the city papers.

On motion, resolved that the members of the Academy be requested to attend the funeral.

*October 30, 1888.*—REGULAR MEETING.

President Harrison in the chair; six members present.

Curator reported that the four cases provided by the contributions of the late Hon. G. H. French and others are being constructed and will soon be furnished.

The president referred to the decease of Mr. French since the last regular meeting and thought it desirable to make this somewhat of a memorial meeting, members presenting such reminiscences or giving expression to their feelings as they might desire.

Mr. Thompson, Mr. Holmes, and Mr. Lynch each made remarks in accordance with this suggestion.

*January 2, 1889.*—ADJOURNED MEETING.

President C. E. Harrison in the chair; eleven members present.

Curator exhibited a series of sixteen fine plaster casts received from Prof. L. A. Cox, of Keokuk, representing beautiful crinoids in his collection, and found in that vicinity. Also, a collection of fifteen species of fossil plants from the Dakota group (cretaceous) collected in Kansas, and sent to the Academy by Charles H. Sternberg, of Lawrence, Kansas, by exchange.

The following paper was presented by title: "The genus, *Ceanothus*, as represented on the Pacific Coast of North America," by Dr. Parry. On motion, referred to Publication Committee.



## PLATE I.

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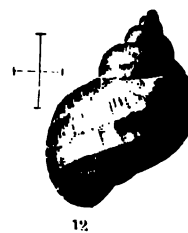
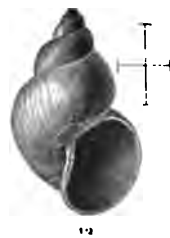
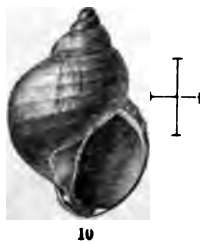
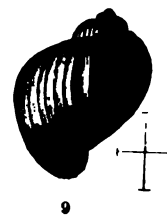
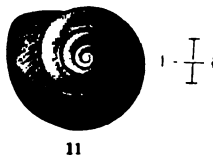
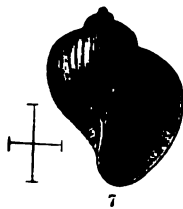
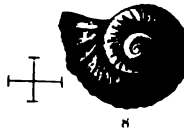
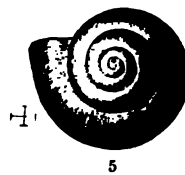
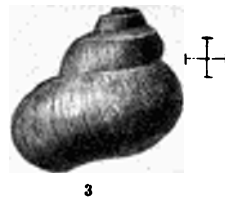
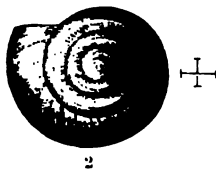
FIGS. 1-3—*Valvata utahensis*.

4-6—*Amnicola dalli*.

7-9—*Radix utahensis*.

10-13—*Limnophysa bonnevillensis*.

PLATE I.







## PLATE II.

All original figures except 14 *b*, 14 *c*, and 17 *a* are enlarged three diameters.

FIGS. 1-6—*P. nevadensis*, carinate forms.

7-8— " smooth var.

9— " operculum.

10— " Outline of Stearns' figure  
in Proc. Phila. Ac. Nat. Sci., p. 173,  
(1883).

11-12—*Pyrgula helvetica* Mich.

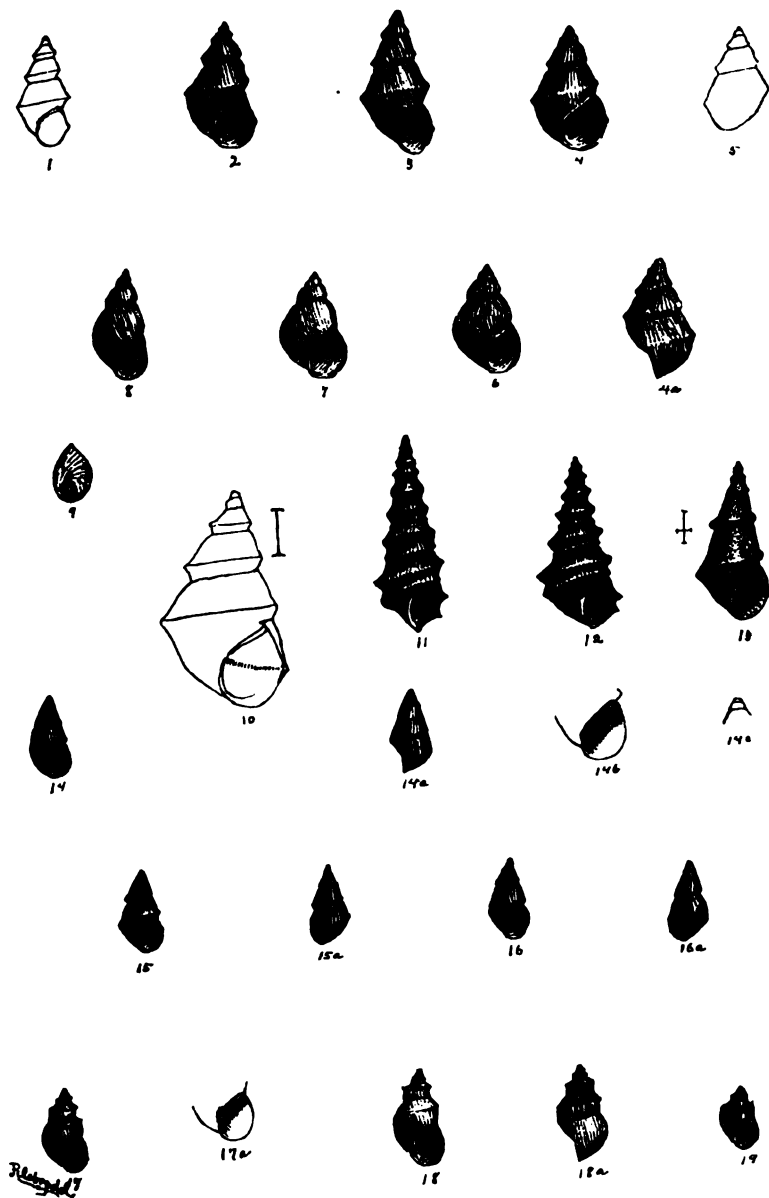
13—*P. scalariformis*—Copy of Wolf's figure  
in Am. Jour. Conch., Vol. V., pl. xvii.,  
fig. 3.

14-16—*P. mississippiensis*.

17-19—*P. spinosus*.

All figures except 10 and 13 are drawn from specimens in the authors' cabinets.

PROCEEDINGS DAVENPORT ACADEMY OF NATURAL SCIENCES—VOL. V.  
 PLATE II.



CALL AND PILSBRY ON PYRGULOPSIS.

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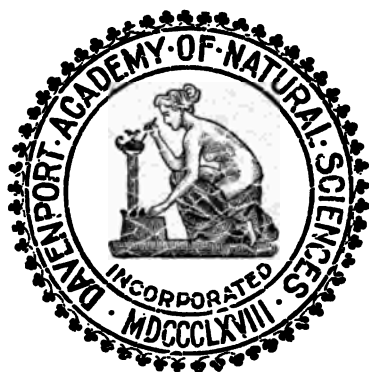
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PROCEEDINGS  
OF THE  
DAVENPORT ACADEMY



NATURAL SCIENCES.

VOLUME VI.

1886-1897.

DAVENPORT, IOWA

PUBLISHED FROM THE INCOME OF THE

Putnam Memorial Fund.

1897.







*W. L. Perry M.D.*

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## PREFACE.

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IN presenting this, the sixth volume of its PROCEEDINGS to the scientific public, the Davenport Academy of Natural Sciences indulges the hope that it may be found to merit a reception no less favorable than that accorded to its predecessors.

It is the expectation of the Academy to publish at shorter intervals in the future than in the past, meanwhile issuing important papers as heretofore in *brochure* form, as soon as possible after their reception.

The recent endowment of the Publication Fund of the Academy by Mrs. Mary L. D. Putnam, Chairman of the Publication Committee, in the sum of nine thousand five hundred dollars, as a memorial to her husband, Charles E. Putnam, and her son, Joseph Duncan Putnam, provides for it assured financial support to the extent of the interest of the sum mentioned.

Early in the history of the organization (1876) the publication of PROCEEDINGS was begun under great difficulties by that indomitable young scientist, J. D. Putnam, and during the short remainder of his life he bent his energies toward placing it on an enduring basis. To this end he was ably assisted by his father, who not only lent the moral support of his approval, but was ever ready to respond to appeals for material aid, and it is eminently fitting that the father's name should be associated with that of the son in this memorial endowment.

The first signature line of the present volume bears date, December 14 1892, the twenty-fifth anniversary of the Academy's founding. Since then the unsparing hand of death has removed many of those most closely connected with its origin and growth.

The demise, shortly after his removal to Minneapolis, of Professor W. H. Pratt, deprived this Academy of a life-long and enthusiastic worker for all pertaining to its interests and those of science in general. A life member and one of the original group to whom it owes its existence, on his foresight and energy the Academy had learned very largely to depend, and his loss is most deeply felt.

Among other prominent members who have passed away since this volume was begun, are Rev. S. S. Hunting of Des Moines, a former President and life member; William H. Holmes of this city, an earnest supporter; and Israel Hall, a friend and life member; while the scientific world at large has suffered irreparable loss in the death of Professors John Tyndall and C. V. Riley, both honorary members, and Charles Wachsmuth, a corresponding member of the Academy.

With a steady growth in its Museum and Library, the latter now numbering over thirty thousand volumes, the Academy yet feels sorely both the

loss of workers and the lack of funds for pushing original investigation. But a glance at the contents of this volume will at least show good work done by associate members.

Articles of especial value and interest are a List of Coleoptera from the Southern Shore of Lake Superior, by Professor H. F. Wickham of the Iowa State University; a Bibliography of Iowa Antiquities, and a Summary of the Archaeology of Iowa, by Professor Frederick Starr of the University of Chicago; and a Revision of the Truxalinae of North America, by Professor Jerome McNeill of the University of Arkansas. The six beautiful plates accompanying the latter paper were reproduced by the Heliotype Printing Company of Boston, from careful delineations by Miss A. Simonds and Miss A. Leverett.

The excellent engraved portrait of Dr. C. C. Parry, which forms the frontispiece to the volume, was donated by Mrs. Parry, who also prepared the list of his published writings. These, with the accompanying Biographical Sketch by Dr. C. H. Preston, will give added interest to the volume for botanists the world over, as well as for the many personal friends and acquaintances of Dr. Parry in this city and elsewhere.

The SYNOPSIS OF PROCEEDINGS has been brought down to the beginning of the present year, and a comprehensive index is appended which will prove helpful to those consulting the volume.

Among the papers in prospect for Volume VII. are one on the Local Geology of Davenport, by Professor W. H. Barris, now ready, which it was intended to have included in Volume VI., and one on the Flora of Scott and Muscatine Counties, Iowa, in course of preparation by Messrs. F. Reppert, A. A. Miller, and W. D. Barnes. Also, biographical sketches of Charles E. Putnam and W. H. Pratt, with portraits, which were to have appeared in this, will be given in the seventh volume.

The Publication Committee takes pleasure in acknowledging the uniform courtesy of Messrs. Edward Borchardt and R. B. Russell, of the Borchardt publishing house, while the volume has been passing through the press.

DAVENPORT, IOWA,  
March 29th, 1897.

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PROCEEDINGS  
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VOLUME VI.

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Recollections of a teacher among our Tama City Indians.
26. CALVIN, SAMUEL. *Prehistoric Iowa*, 8vo., pp. 5-29, 1892.  
Lecture; printed in pamphlet form by State Historical Society.  
Mainly geological; refers to implements from Iowa loess, the  
Neanderthaloid Skulls, and approvingly to the Elephant  
Pipes.
27. CAMPBELL, AUGUSTUS. *American Antiquarian*, ix., p. 43.  
"Modern Mound Builders." Vaulted mound near East Du-  
buque, contained sitting skeletons and a cup.
28. CAMPBELL, JOHN. *American Antiquarian*, iv., 145.  
"Proposed Reading of the Davenport Tablets." Quite an  
elaborate article. The tablet a Hittite relic.
29. ———— *Trans. Am. Assoc. Adv. Sci.*, 1883, pp. 419-421.  
"The Mound Builders Identified." Study of the Khitans.  
Khita hieroglyphics compared with the Davenport Tablets  
inscriptions.
30. CATLIN, GEORGE.  
Information about the Sacs and Foxes scattered through his  
work are collected in Donaldson's article (No. 42).
31. CHURCHILL, A. D. *Proceedings Davenport Academy*, ii., 257.  
"East Davenport Mounds." Exploration of three mounds.  
No remains.
32. CLAYPOLE, E. W. *Trans. Am. Assoc. Adv. Sci.*, 1887, p. 312.  
"What Is It?" Refers to the curious cast-like objects in the  
form of shells, possessed by the Academy, and believes them  
made by the Indians or for trade with them.
33. CONANT, A. J. *Footprints of Vanished Races in the Mississippi*  
[*Valley*, 8 vo., pp. 120, St. Louis, 1879.  
Cites Pidgeon at pp. 15-24, and p. 70, regarding Iowa mounds;  
also, Iowa planter's opinion of "corn-field mounds."

34. CUTTS, J. B. *Smithsonian R.*, 1872, 417.  
 "Ancient Relics in North-western Iowa." Pottery fragments,  
 charcoal, stone circles, etc., near Little Sioux River.
35. DAHLBERG, ROBT. N. and CHAS. I. *Smithsonian R.*, 1879, 349.  
 "Ancient Pottery from Mounds on the Des Moines River."  
 Treats of its composition and manner of manufacture.
36. DAVENPORT ACADEMY. *Proceedings*, i.  
*Brief references to Antiquities, etc.*  
 Bone Implement from East Davenport, 43.  
 Copper Implement described, 59.  
 Prehistoric Cremation Furnace, 64. With figure, Plate 26.  
 Copper Axe, 73.  
 New Boston and Toolesboro Explorations, 77.  
 List of Museum Additions, —.
37. ————— *Proceedings*, vol. ii.  
*Brief References.*  
 Additions to Museum, 49, 214.  
 Mound Builders' Cloth, 6.  
 "Gass Tablets" announced. Resolution, etc., 81, 86, 256.  
 Stone Carving, Hardin County, 115.  
 S. F. Baird's "Opinion of Tablets," 127, 145.  
 Cleona Inscriptions presented, 137.  
 Letter asking advice, from J. W. Powell, 137.  
 "Pleasant Valley Carving," 138.  
 Publication Committee's Report on Tablets, 216.  
 Mound opened below Rockingham, 219.  
 Elephant Pipe. Circumstances of, 348.
38. ————— *Proceedings*, vol. iii.  
*Brief References.*  
 President's address refers to relics and explorations, 9, 13.  
 Curator's Report, 6.  
 Elephant Pipe No. 2 shown, 130.  
 Mounds near Wheatland, 134.
39. ————— *Proceedings*, vol. iv.  
*Brief References.*  
 To Henshaw's Article, 246, 249, 250.  
 Exploration of large mound by Gass, Muscatine Co., 210.

40. DAVIS, M. W.      *History of Johnson County, Iowa City, 1883.*  
Davis and Col. Trowbridge are quoted regarding the groups of mounds of the county, and some remains and relics. particularly a complete vessel of pottery, are described.
41. DEAN, SETH.      *Smithsonian R.*, 1881, 528.  
"Antiquities of Mills County." Circular depressions in bluffs, and mounds near Glenwood.
42. DONALDSON, THOS. *Smithsonian R.*, 1885, pt. 2, App., pp. 13-39.  
"The George Catlin Indian Gallery." Catlin's outline pictures of Sacs and Foxes are here reproduced, with his observations upon the tribe. Some notes regarding their present condition are added.
43. DORSEY, J. O.      *Transactions Anthropological Society*, vol. ii.  
"Gentile System of the Iowas."
44. EVANS, S. B.      *Smithsonian R.*, 1879, 344.  
"Notes on Some of the Principal Mounds of Des Moines Valley." Diagram 1 shows five locations near Ottumwa. Diagram 2 shows locations of shell-heaps and mounds near Keosauqua. Explorations of mounds described.
45. ————— *Chicago Times.*  
"Mounds of Des Moines Valley." Occasional papers on this subject during 1879 and 1880.
46. ————— *Ottumwa Democrat.*  
Occasional papers from 1870 onward.
47. ————— *Western Scientist*, vol. i.  
"Mounds of Des Moines Valley." (Magazine published at Ottumwa. Crawford, editor.)
48. EVANS, S. B. *History of Wapello County, Chicago*, pp. 336-342.  
Articles in *Smithsonian Reports* and *Chicago Times* are here quoted. The same article also appears in the History of Van Buren County.

49. FARNSWORTH, P. J. 1875.  
"Mounds and Mound-Builders." Paper read before "Iowa Academy of Natural Science."
50. ————— *Popular Science*, xx., 266.  
"Identity of Indians and Mound-Builders." Letter referring to platycnemism in certain mound remains, and states that Dr. Farquharson found the same in Sioux remains at Davenport.
51. FARQUHARSON, R. J. *American Antiquarian*, i., 136.  
"Phonetic Elements in American Languages." Speaks of Mexican symbol for "war."
52. ————— *American Antiquarian*, i., 168.  
"Davenport Tablets." Quotes M. Lucien Adam, at Luxembourg meeting of the "Americanistes," as endorsing the tablets.
53. ————— *American Antiquarian*, ii., 67.  
"The Elephant Pipe." History of finding Pipe No. 1. Description. Table of measurements of elephants and mastodons. Points out several examples of omission of "tusks" in representations.
54. ————— *American Antiquarian*, iii., 330.  
"Amulets and Post Mortem Trepanation." Describes a "ron-delle" and two skull fragments from which such objects had been cut. All from Iowa. Refers to literature on subject.
55. ————— *Proceedings Davenport Academy*, i., 117.  
"Recent Archæological Discoveries at Davenport of Copper Axes, Cloth, etc., etc." Valuable paper of 26 pp. "Cook Farm Mounds" exploration. Many notes regarding the relics found.
56. ————— *Proceedings Davenport Academy*, ii., 103.  
"On Inscribed Tablets." Quite elaborate; 12 pp. Full discussion. Figures.

57. ———— *A. A. A. S. Trans.*, 18, 1875.  
 "Recent Exploration of Mounds Near Davenport," 18 pp.,  
 with 6 plates. Practically same as No. 33.
58. FOSTER, J. W. *Prehistoric Races of the U. S.*, p. 105.  
 Simply mentions small mounds near Dubuque.
59. FULTON, A. R. *History of Boone County*, 8 vo., 1878.  
 "Archæology of the North-west." References to Iowa mounds.  
 Article of little value. Occurs also in History of Mahaska  
 County.
60. FULTON, A. R. *The Red Men of Iowa*, 8 vo., 558 p., 1882.  
 Treats of past history and present condition of our Iowa tribes.  
 Pages 81-94 treat of "Prehistoric Man."
61. GALLARD, ISAAC *Annals of Iowa*, vii., 347-366.  
 "Indian Tribes of the West: Their Languages, Religion, and  
 Traditions." The best informations upon the Sacs and  
 Foxes.
- GARRETSON, JOHN. (See No. 5.)
62. GASS, J. *Proceedings Davenport Academy*, ii., 92.  
 "Excavation of Mound No. 3, Cook Farm," Davenport. De-  
 scription of openings in 1874 and 1877. Finding of  
 "Tablets," etc.
63. ———— *Proceedings Davenport Academy*, ii., 140.  
 "Mounds in Louisa County." Describes opening of nine  
 burial mounds.
64. ———— *Proceedings Davenport Academy*, ii., 189.  
 "Mounds in Louisa County." Opening of several mounds.  
 Relics found. (See No. 11.)
65. ———— *Proceedings Davenport Academy*, ii., 141.  
 "Mound No. 10, Cook Farm." Account of opening. Dia-  
 gram showing *curious* structure.

66. ———— *Proceedings Davenport Academy*, ii., 142.  
"Inscribed Stones, Cleona Township, Scott County." Five found in bed of creek.
67. ———— *Proceedings Davenport Academy*, ii., 172.  
"Inscribed Rocks in Cleona Township." Fuller description than No. 66. Stones are hard, heavy, coarse greenstone.
68. ———— *Proceedings Davenport Academy*, ii., 155.  
• "Mound in Jackson County." Opened for Mr. Gass. Simple structure. Some relics.
69. ———— *Proceedings Davenport Academy*, ii., 173, 219.  
"Mounds in Jackson County." Further exploration. Location of groups, and excavation.
70. ———— *Proceedings Davenport Academy*, iii., 183.  
"Ancient Fortification, Louisa County." Grandview Township. Two earth-walls enclosing two acres between ravines. Diagram.
71. ———— *Proceedings Davenport Academy*, iii., 189.  
"Mound Explorations." Location and examination of many mounds in Grandview Township. Finding of Toolesboro Tablet. Sums up year's work, pp. 140-146.
72. ———— *Proceedings Davenport Academy*, iii., 191.  
"Mounds Near Muscatine." Examination of some mounds in two groups.
73. HARRISON, CHARLES E. *Proceed. Davenport Academy*, ii., 221.  
"Cook Mound, No. 11." Finding of Tablet 3. Other relics of interest.
74. ———— *Proceedings Davenport Academy*, iv., 197.  
"Report of Mound Exploration, Pine Creek, Muscatine County." Open only unopened mound in group of ten. No relics.

75. HENDERSON, JOHN J. *Smithsonian R.*, 1882, 686.  
 "Aboriginal Remains Near Naples, Ill." Thirty-five pages on mounds and builders. Pages 713-717 is list of "Fauna of Mound-Builders' Era," in which various Iowa pipes are mentioned.
76. HENSHAW, H. W. *Bureau of Ethnology, 2d Ann. Rept.*, 123.  
 "Animal Carvings from Mounds in Mississippi Valley." Attacks Elephant Pipes on pp. 155-157.
77. HOLMES, WM. H. *Ancient Pottery of Mississippi Valley*, 8 vo., [pp. 73.  
 "A Study of the Davenport Academy's Collection." Printed in advance of vol. iv. of Davenport Academy's Proceedings.  
 ———— *Proceedings Davenport Academy*, iv., 123 *et seq.*  
 The same.
78. HOLMES, WM. H. *Fourth Ann. Rept. Bureau of Ethnology*, [pp. 361-436.  
 "Ancient Pottery of Mississippi Valley." Many specimens from Academy described. Iowa specimens described on pp. 427-429.
79. HOWE, S. S. *Annals of Iowa*, i., No. 3, p. 33.  
 "Indian Mounds."
80. JORDAN, CORA M. *American Antiquarian*, 1892, pp. 226-227.  
 "A Stone Dam in Iowa." A stone dam, a mound (entirely artificial?), and a copper cup (lost) from Plum Creek, Knowlton Township, Ringgold County, described.
81. KIMBERLING, L. G. *Knoxville Journal*, 1883.  
 Various papers on mounds of *unusual* interest (see No. 109) in the vicinity of Knoxville, published during 1883-84 in the *Journal of Knoxville*, F. C. Barber, publisher.
82. LEWIS, T. H. *Science*, v., 131.  
 "Notice of Some Recently Discovered Effigy Mounds." Refers only to Iowa. Mounds mostly Minnesotan.

83. ———— *Science*, vi. (No. 146.)  
 "Effigy Mounds in Iowa." Group in Clayton County, near North McGregor. Shows disproportions. Head *generally* south. Feet *generally* toward water.
84. ———— *American Anthropologist*, 1889, pp. 159-164.  
 "Stone Monuments in South Dakota." Says that similar monuments occur in Iowa.
85. ———— *American Anthropologist*, 1890, pp. 269-274.  
 "Stone Monuments in North-western Iowa."
86. ———— *Appleton's Annual Cyclopædia*, 1889, pp. 117-122.  
 "Cave Drawings." Describes and figures interesting wall designs from caves of Allamakee County.
87. ———— *Science*, xv. (1890), p. 275.  
 "Effigy Mounds in Valley of Big Sioux River, Iowa." In the Lyon County group described by Starr; a fort also described.
- LOOS, PROF. *Chicago Journal*, June 23, 1886.  
 See Beal and Loos, Profs.
88. LINDLEY, CLARENCE. *Proceedings Davenport Academy*, i., 112.  
 "Mound Exploration, 1875, Muscatine County." Groups near Pine Creek. Burial Mounds. Some opened. Relics.
89. ———— *Proceedings Davenport Academy*, ii., 83.  
 "Mound Exploration in Jackson County." Groups in Iowa Township. Skeletons and a few relics.
90. MACLEAN J. P. *The Mound-Builders*, 12 mo.  
 On page 116 refers to Davenport Tablet.
91. MAILLERY, GARRICK. *Fourth Ann. Rept. Bureau of Ethnology*,  
 [p. 23.  
 "Pictographs of North American Indians." Refers to incised and painted pictographs on cliffs in North-eastern Iowa.

92. MASON, OTIS T. *American Naturalist*, 1878 (xii.).  
Announces discovery of tablet, and suggests caution (p. 322),  
to which Mr. J. D. Putnam replies (p. 400) that there can be  
no room for fraud.
93. MATERIAUX POUR L'HISTOIRE DE L'HOMME. 1887.  
Refers to mounds near Clayton.
94. MCGEE, W. J. *Am. Jour. Sci. and Arts*, ser. iii., vol. xvi., p. 272.  
"Artificial Mounds in North-eastern Iowa, and the Evidence of  
the Employment of a Unit of Measurement in Their Con-  
struction." Six-page article on Metrology.
95. ———— *American Antiquarian*, iii., 194.  
"Inductive Metrology." Compares his notes and methods with  
Petrie's, as given in Petrie's book of above title. Arrives at  
similar conclusions.
96. ———— *Am. Jour. Sci. and Arts*, ser. iii., vol. xvi., p. 458.  
"On an Anatomical Peculiarity by which the Crania of  
Mound-Builders may be distinguished from those of Mod-  
ern Indians."
97. MOULTON, M. W. *Smithsonian R.*, 1877, 250.  
"Mounds in Delaware County." Groups of mounds and  
earthworks forming nearly a hollow square.
98. MYERS, JUSTUS M. T. *History of Lee County*, pp. 427-428.  
Mounds described. In one thirty-two skeletons seated in  
vaults of limestone slabs.
99. MURDOCH, SAMUEL. *Iowa Historical Record*, ii., p. 356.  
"The Mound-Builders of the Mississippi Valley." General dis-  
cussion to prove Mound-Builders ancient, extinct, and can-  
nibal.
100. ———— *Iowa Historical Record*, 1888, pp. 28-32.  
Mounds long and round. The former older. Two races of  
builders; the later with conical skulls.

101. DE NADAILLAC, MARQUIS. *Prehistoric Peoples*, pp. 358-360.  
Quotes Clement L. Webster regarding Floyd finds.
102. NISSLEY, J. R. *American Antiquarian*, 1887, p. 303.  
"Skeletons and Relics from Iowa." Skeletons of low type  
from flat near Niobrara River. Stone ball with incised  
lines.
103. NEGUS, CHARLES. *Annals of Iowa*, v. (1867), p. 840.  
"Antiquities." In Jefferson County, a series of mounds; also  
an iron cross bolted into sandstone bluff near Cedar River.
104. ———— *Annals of Iowa*, xii., pp. 256-262.  
"The River of the Mounds." Describes mounds in various  
parts of Iowa. Some good information.
105. ———— *Tuttle's History of Iowa*, pp. 32, *et seq.*  
Same material as in the two preceding articles.
106. PEET, STEPHEN D. *American Antiquarian*, i., 106.  
"Recent Mound Explorations." Gives a short description of  
Davenport Tablets.
107. ———— *American Antiquarian*, ii., 320.  
"Elephant Pipe No. 2." Notices discovery, and gives brief  
description.
108. ———— *American Antiquarian*, vi., 275.  
"Measurements Among Mounds." Refers to McGee's article  
(No. 95). Thinks the unit *not* McGee's and Whittlesey's  
cubit — 25.7 inches,— but the pace — three feet.
109. ———— *American Antiquarian*, vi., 276.  
"Mounds at Knoxville." Interesting system of mounds, earth-  
works, raised ways, etc. Refers to articles by Kimberling  
(No. 81).
110. ———— *American Antiquarian*, viii., 46.  
"Are the Davenport Tablets Frauds?" Ten-page editorial.

111. ————— *American Antiquarian*, viii., 117.  
"The Points Involved." Three-page editorial, replying to Pratt (No. 136), and summarizing.
112. ————— *American Antiquarian*, viii., 256.  
Editorial note against "Elephant Pipes and Mounds."
113. ————— *American Antiquarian*, viii., 256.  
Editorial criticism of Holmes' paper (No. 77). Culture of Mississippi Valley region *not* so homogeneous as Holmes thinks.
114. ————— *American Antiquarian*, viii., 309.  
"Extra-limital Animals and Mound-Builders Pipes." Drawn out by No. 76. Sustains claim for "extra-limitals." Compares an Academy "Otter Pipe" with "Manitu," and figures both. Refers to Academy difficulties.
115. ————— *American Antiquarian*, ix., pp. 242-246.  
"The Mastodon in America and the Mound-Builders." Argument to show status of the question. Mentions Davenport Tablets and Pipes.
116. ————— *American Antiquarian*, 1889, pp. 359-378.  
"Burial Mounds Viewed as Monuments." On p. 368 refers to Academy's work on Cook Mounds.
117. ————— *American Antiquarian*, 1890, p. 187.  
"Distribution of Effigy Mounds." Refers to Lewis' Lyon County mound, and calls it a bear with paws extended.
118. ————— *American Antiquarian*, 1891, pp. 255-281.  
"The Mysterious Race." Refers to Iowa (p. 264); to Elephant Pipes and Tablets (p. 266), and figures the Cook Farm group (p. 275).
119. ————— *American Antiquarian*, 1891, pp. 305-330.  
"The Religion of the Mound-Builders." References and discussion regarding Iowa specimens scattered through article — pp. 309, 310, 317, 320.

120. ———— *American Antiquarian*, 1892, pp. 59-86.  
 "The Mound-Builders and the Mastodon." The tablets and pipes (pp. 71-76), and the structure of the Cook Farm mounds (p. 79).
121. PIDGEON, WILLIAM. *Traditions of De-coo-dah and Antiquarian* [*Researches*, 1 vol., 16 mo., 1858, N. Y.  
 A strange work. Iowa mounds are described and "elucidated" at pp. 115-118, 129-130, 201-204, 231-238.
122. POPULAR SCIENCE MONTHLY. i., p. 768.  
 "Notes." Mentions Woodman at A. A. A. S. 1872 meeting reporting on mounds of Dubuque.
123. ———— xix., 128.  
 "Miscellany." Speaks of Pratt's address and of Academy's collections.
124. ———— xx., 421.  
 "Miscellany." Refers to Maj. Beebe's "translations" of Davenport, Piqua, Grave Creek, and Pemberton Inscriptions A. A. A. S. meeting.
125. ———— xxiii., 432.  
 "Notes." Mentions gifts of mound pipes to Academy by Mr. Gass.
126. ———— xxvii., 707.  
 "Review of Putnam's Vindication."
127. PRATT, W. H. *Proceedings Davenport Academy*, i., 106.  
 "Mounds of Louisa County—Toolesboro." Interesting relics. Bird Pipes with "eyes." Copper Axes with impressions, etc.
128. ———— *Proceedings Davenport Academy*, i., 106.  
 "Mounds Near Pine Creek." Portion of skull found with "rondelles" cut out.
129. ———— *Proceedings Davenport Academy*, ii., 38.  
 "On Shell Moneys." Eight pages. Refers to shell beads and "pearl eyes," and to copper axes.

130. ———— *Proceedings Davenport Academy*, ii., 148.  
 "Mounds on Allen Farm." Group of six mounds. A few  
 relics. One "curved base" pipe.
131. ———— *Proceedings Davenport Academy*, ii., 156.  
 "Shell-beds in Vicinity of Davenport." Thinks all but one  
 are *natural*. Formed at time of a *higher* river.
132. ———— *Proceedings Davenport Academy*, ii., 256.  
 "Curious Relic From Cook Farm." Rudely carved animal.  
 Quartz crystal eyes. Mound No. 3.
133. ———— *Proceedings Davenport Academy*, iii., 151.  
 "Mound-Builders." Presidential address. Status of Mound-  
 Builders. Condition of Academy's collection.
134. ———— *Science*, i., 496.  
 Letter briefly referring to relics from Southern Mounds, and  
 to Cranial Deformities.
135. ———— *Science*, iii. (No. 71.)  
 Report of Academy meeting. Refers to "Incà-bone."
136. ———— *American Antiquarian*, viii., 92.  
 "The Davenport Tablets Genuine." Four-page reply to (No.  
 110) Peet.
137. PRICE, ELIPHALET. *Annals of Iowa*, vi., p. 121.  
 "On the Origin, Antiquity, and Object of the Mounds of the  
 Mississippi." Of no value on Iowa.
138. PROUDFIT, S. V. *American Antiquarian*, iii., 139.  
 "Earthworks on Missouri River." Read before Iowa Academy  
 of Science, Des Moines.
139. ———— *American Antiquarian*, iii., 271.  
 "Mounds of South-west Iowa." Old trails, mounds, and  
 lodges described. Record of relics from undisturbed loess.

140. *American Antiquarian*, viii., 222.  
 "The Lodge-Dweller." Paper read before Anthropological Society, Washington, April 20, 1886. "Lodge-Dwellers" intermediate to Indians and Mound-Builders.
141. *American Antiquarian*, viii., 299.  
 "Pottery Vessels in Glenwood." Broken vessel from six feet down in loess.
142. PUTNAM, C. E. *Elephant Pipes*, 8 vo., 40 pp., 1885.  
 A vindication of the Elephant Pipes and Inscribed Tablets from the accusations of the Bureau of Ethnology.
143. ——— *Elephant Pipes and Inscribed Tablets*, 8vo., 96 [pp., 1886.  
 "Second edition" of No. 142, with "correspondence" added. Printed separately and as an appendix to vol. iv. of Proceedings.
144. ——— *Science*, vol. vii. (No. 157.)  
 "The Davenport Tablets." Reply to Thomas' letters (No. 171, No. 172).
145. ——— *Science*, vii. (No. 171.)  
 "The Davenport Tablets." Letter from Mr. Gass *disavowing intentional fraud*. (See Nos. 8 and 9.)
146. RAU, CHARLES. *Prehistoric Fishing*, p. 125.  
 Describes an Arkansas bone fish-hook from the Academy's collection.
147. ——— *Prehistoric Fishing*, pp. 241-242.  
 Summary of C. A. White's articles upon shell-heaps.
148. READ, M. C. *American Antiquarian*, iv., 225.  
 "The Welsh Butterfly. Is the Inscription Old?" Refers with doubt to tablets.
149. RUST, H. N. *Proceedings A. A. A. S.*, 1882, 584.  
 "Remarks on Davenport Tablet." (Abstract.) Translation given by modern Dakotas.

150. SCHMIDT, E. *Kosmos*, 1884, 146.  
"Mound-Builders and Their Relation to Historic Indians."  
Quoted by C. Thomas against Davenport Tablets.
151. —————  
"Die Præhistorischen Kupfergeräthe Nord-Amerikas." Describes the Davenport celts.
152. SCIENCE. Vol. i., No. 7.  
Mentions Mr. Gass' gift of thirteen "Mound-Builder Pipes" to Academy's collection, making fifty-six in whole series.
153. ————— Vol. i., No. 9, p. 263.  
Mention of Effigy Mounds in North-western Iowa.
154. ————— viii., 1886, p. 186.  
Note upon the Louisa County exploration of the Academy.
155. ————— xix., 1892, p. 21.  
Notice of arrowhead from loess near Muscatine, and of implements from Council Bluffs loess.
156. SEYFFARTH, G. *Proceedings Davenport Academy*, iii., 72.  
"The Indian Inscriptions of Davenport." Elaborate classification and comparison of characters. Syllabic. Allied to Japanese, Chinese, and Corean. Considers the designs a "sacrificial scene" and a "record of the deluge."
157. SHAW, JAMES. *Smithsonian R.*, 1877, 257.  
"The Mound-Builders of the Rock River Valley." Mainly Illinois, but refers somewhat to Mercer County.
158. SHORT, JOHN G. *North Americans of Antiquity*, 8vo.  
Pp. 37-40, refers to Iowa Mounds and Davenport Tablets; 169-170, quotes Farquharson's cranial measurements; 530-531, refers to Louisa County pipes.
159. SLOAN, JUDGE. *History of Wapello Co.*, Chicago, pp. 336-342.  
Quoted in reference to mounds near Ottumwa. The same article is given in *History of Van Buren County*, pp. 334-341.

160. SMITH, JOEL W. *Trans. A. A. A. S.*, 1888, p. 329.  
"Iowa Mound-Builders' Relics." (Title only.)
161. SMITHSONIAN INSTITUTE REPORT. 1880.  
*Abstracts of Correspondence.*  
B. Morgan, Mounds of Des Moines Valley, 445.  
H. T. Woodman, Unique Mound for Iowa near Dubuque,  
448.
162. ————— 1879, 430.  
*Abstracts of Correspondence.*  
S. Allis, Lodge Cavities on Bluffs in Mills County.  
W. V. Banta, Mounds in Henry County.  
L. Bassett, Implements from Keokuk.  
D. C. Beaman, Mounds near Keosauqua.  
F. C. Canda, Copper Implements from Grandview.  
H. Davis and W. A. McDonald, Clayton County "Lookout  
Mounds."  
S. B. Evans, Summary of article in same volume. (No. 23.)  
W. H. Ketterman, Mounds of Wapello County.  
J. M. Mansfield, Mounds of Henry Co., near Mt. Pleasant.  
F. M. Witter, Mounds and Relics, Toolesboro.
163. SQUIER, E. G. *Serpent Symbol in America*, 8 vo.  
Pp. 140-142, quotes "Pidgeon" for serpent symbols near  
Guttenburg. Two figures.
164. STARR, FREDERICK. *American Antiquarian*, 1887, p. 303.  
Shell-heaps at Cedar Rapids; attributed by mistake to W. G.  
Evans.
165. ————— *American Antiquarian*, ix., pp. 361-363.  
"Mounds and Lodge Circles in Iowa." Describes group of  
mounds and many stone circles in Lyon County; also ob-  
jects found there.
166. ————— *American Antiquarian*, 1888, pp. 279-282.  
"Preservation by Copper Salts." The cloth-wrapped celts  
are described; also a Lyon County skeleton with preserva-  
tion of face-flesh and hair.

167. ——— *Proceedings Davenport Academy*, v., pp. 110-112.  
 "Mound Exploration in North western Iowa." Description  
 of the mound relics and "stone circles" near Ia Valley,  
 Lyon County.
168. STEPHENSON, J. E. *American Antiquarian*, ii., 89.  
 "The Mound-Builders." Paper before Muscatine Academy of  
 Science. Restores the past from relics. Two figures and  
 map.
169. THOMAS, C. *American Antiquarian*, vii., 212.  
 "Ancient Works in Iowa." Near New Albion, on Little Iowa  
 River. Interesting remains.
170. ——— *Science*, vi., No. 151, 564.  
 "The Davenport Tablets." Limestone tablet a "plant."  
 Quotes Tiffany. Objects to mode of occurrence.
171. ——— *Science*, vi., No. 152.  
 "The Davenport Tablets." Against slate tablet. Based on  
 characters.
172. ——— *Science*, vii., No. 160.  
 "The Davenport Tablets." Reply to Putnam (No. 94).  
 Quotes "doubts" from various authors.
173. ——— *Fifth An. Rept. Bureau of Ethnology*, 1887.  
 "Burial Mounds of the Northern Section of the United  
 States." In pp. 24-38 are described the Cook farm group;  
 and investigation conducted by the Bureau in Allamakee  
 and Dubuque Counties.
174. ——— *Catalogue of Prehistoric Works East of the Rocky*  
*Mountains*, 8 vo., 1891.  
 The Iowa list occupies pp. 83-88. Summary of many state-  
 ments by others. Original notice of mounds in Adams,  
 Allamakee, Clayton, Clinton, Dubuque, Hamilton, Lee,  
 Lyon, Marion, Marshall, Van Buren, Warren, and Wright  
 Counties.

175. THOMPSON, THERON. *American Antiquarian*, ii., 60.  
     " Mounds at Muscatine." Letter describing mounds, remains,  
     pot, and relics.
176. ————— *American Antiquarian*, i., 172.  
     " Mound Relics." Describes copper relics, pot, and *iron* axe.
177. ————— *Smithsonian R.*, 1879, 359.  
     " Mounds in Muscatine County." Describes groups of  
     mounds, location, arrangement, etc.
178. TIFFANY, A. S. *Proceedings Davenport Academy*, i., 113.  
     " Mound Explorations in 1875." Near Davenport in Buffalo  
     Township, at Gilbert and Rockingham.
179. TOOLE, WILLIAM L. *Annals of Iowa*, v., p. 45, etc.  
     " Incidents of Settlement of Louisa County." Refers to  
     mounds, "fort," and relics.
180. TROWERIDGE, C. S. *History of Johnson Co.*, Iowa City, 1883.  
     Quoted in reference to mound groups near Iowa City.
181. UHLE, MAX. *Zeitschrift fur Ethnologie*, 1887.  
     Long paper in reference to the Elephant Pipes.
182. VAN ALLEN, G. C. *Smithsonian R.*, 1882, 682.  
     " Mounds in Henry County." Three burial mounds. Some  
     remains and relics.
183. ————— *Young Mineralogist and Antiquarian*, 1884, p. 34.  
     Mounds in Henry County. (Cf. Smith.)
184. WASHINGTON EVENING STAR. May 3, 1889.  
     Small mound near Floyd explored. Yielded skeletons.
185. WEBSTER, CLEMENT L. *American Naturalist*, xxiii., 1889, pp.  
     [185-188].  
     " Ancient Mounds at Floyd, Iowa." Five seated skeletons in  
     a stone-lined basin. One skull, Neanderthaloid.

186. ———— *American Naturalist*, xxiii., 1889, pp. 650-655.  
"Aboriginal Remains near Old Chicasaw." One mound yielded three sitting skeletons, all with Neanderthaloid skulls.
187. ———— *Smithsonian Annual*, 1887, i., pp. 575-589.  
"Ancient Mounds and Earthworks in Floyd and Cerro Gordo Counties." One with a layer of broken pottery; one stratified; a group of thirty-one, some of which yielded interesting bundles of bones; also a crematory.
188. ———— *Smithsonian Annual*, 1887, i., 590-592.  
"Indian Graves in Floyd and Chicasaw Counties." Several, some quite recent, with details of construction.
189. ———— *Smithsonian Annual*, 1887, i., pp. 593-597.  
"Ancient Mounds in Johnson County." Locates groups of mounds of two types — largely as Davis and others.
190. ———— *Smithsonian Annual*, 1887, i., pp. 598-602.  
"Ancient Mounds in Iowa and Wisconsin." Quoted mainly from a Mr. Knapp. Refers to mounds near Guttenburg, Garnavillo, and Buena Vista; also describes Pottawatomie flint chipping.
191. ———— *Smithsonian Annual*, 1887, i., pp. 603-604.  
"Mounds of the Western Prairies." Describes mounds made by various mammals, and often mistaken for human constructions.
192. WHITE, CHARLES A. *American Naturalist*, ii. (1868).  
"Lakes of Iowa, Past and Present." Describes the natural formation of "wall lakes," so often considered the work of a vanished race — as by Peschel (*Races of Man*, p. 426).
193. ———— *Annals of Iowa*, vi., pp. 19-23.  
"Indian Mounds." Refers to location of mounds usually in the State, and to mounds in Johnson and Van Buren Counties. Particularly mentions some near Sac City.

194. ————— *Compte rendu. Int. Cong. Prehist.*, Bologna, 1871,  
"Kjoeckkenmöddings de l'Amerique du Nord." [pp. 379 et.
195. ————— *American Naturalist*, iii., 1870, 54.  
"Kjoeckkenmöddings in Iowa." Note. Heaps at Keosauqua, with bones and relics.
196. ————— *Proceedings A. A. A. S.*, 1873, 133.  
"Kjoeckkenmöddings in Iowa." Heaps at Keosauqua, Sabula, Belleville.
197. WILLIAMS, WILLIAM. *Annals of Iowa*, vii., p. 339.  
"Ancient Fortifications and Mounds in Webster County."  
Locates and describes mounds and embankments, and mentions relics found.
198. WILSON, THOMAS. *Annual Report U. S. N. M.*, 1889, p. 330.  
Notes that Dr. F. A. Steinmeyer donates five implements of paleolithic type, from near Bonaparte, to the Smithsonian Institution.
199. WITTER, F. M. *Weekly Tribune*, Muscatine, Nov. 21, 1878.  
"Notes on Mounds and Mound-Builders." Read before Muscatine Academy of Science.
200. ————— *History of Muscatine Co.*, Chicago, 1879, Western  
"Prehistoric Remains in Muscatine County." [History Co.
201. ————— *Tribune*, Muscatine, Nov. 5, 1879.  
"Mounds and Mound-Builders in Muscatine County." Read before Muscatine Academy of Science.
202. ————— *American Geologist*, ix., p. 276.  
—————. Reports finding of arrow-point in Muscatine loess.
203. WOODMAN, H. T. *Proceedings A. A. A. S.*, 1872, 225.  
"Mounds near Dubuque." Group of seventy. Some regularity in arrangement.

204. LYNCH, E. P., A. C. FULTON, C. E. HARRISON, C. H. PRESTON.  
[*Proc. Dav. Acad.*, v., 37-42.  
"Mound Explorations at Toolesboro, Louisa County, Iowa."  
Three mounds opened, all yielding skeletons; in one interesting copper celts wrapped with cloth, or enclosed in bark, and stone pipes; in another, pottery vessels.
205. HARRISON, C. E., and W. H. PRATT.      *Proc. Dav. Acad.*, v.,  
[43-44.  
"Additional Explorations at Toolesboro." One mound opened yielded skeleton and one very low-type skull; among the relics one stone pipe.

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NOTES :

1. The author regrets that on account of a considerable space of time passing between the preparation of the first and last series of references, these are not in all cases similar in form. Time did not allow of rewriting

2. The author has not seen articles 18, 24, 181, 183, 184, 191

## BUDDHISM IN AMERICA.

BY EDWARD L. BERTHOUD.

TO MY FRIENDS OF THE DAVENPORT ACADEMY:

*Ladies and Gentlemen*—With much diffidence I impart to you a curious coincidence which I have in the past year examined, bearing upon the mooted point of the frequentation, or, perhaps, more properly speaking, upon the discovery by Chinese Buddhist priests of North America in the present boundaries of Mexico or Southern California.

The original account was derived, about the year 1761, by De Guignes, a celebrated French sinologist, from the ancient year-books or annuals of the Chinese Empire, and its substance is about as follows: "That in the year 499 of our era one Hoei-schin, a Buddhist missionary (his name signified 'universal compassion') came to Hua-Kang in China, and he narrated that he had come from a country named 'Fu-Sang,' which is 20,000 Chinese miles, or 'li,' easterly from 'Tahan,' the Chinese name for Alaska and the Aleutian Isles. That Hoei-schin also told that many trees called Fu-sang grew there, whose tender sprouts were eaten, whose fruit was like unto a 'pear' in shape but red, while from the bark of this tree the inhabitants prepared a sort of linen, and also ornamented stuffs." All of which agrees remarkably with the Mexican maguey plant, or agave, which to-day precisely produces the same articles of every-day use for the lower classes of Old Mexico. During a recent visit to Arizona and the Sonora border, I have repeatedly seen the agave plant, and coarse cloth made from its fibres, while its tender heart was eaten by the Apaches and other Indian tribes, and the Mexicans.

Hoei-schin also stated that five beggar Buddhist monks went there in 458, and succeeded in enlightening the people there with the doctrines, writings, and images, of Buddha. He also describes the customs of the people he saw there, their products, and the domestic animals used; that they had no knowledge of iron, but that gold, silver, and copper were not prized nor used as money; and that horses (?), oxen, and stags were harnessed to wagons, etc.

This original publication of De Guignes was violently attacked and criticised by Klaproth, yet it was again reaffirmed by Prof. Carl Neumann, professor of oriental languages at Munich, and again by Mr. Gustave d'Eichthal was defended and vindicated. I will not follow this question any further than to add that the confirmation of this fact inasmuch as it relates to Buddhist writings and remains, has not heretofore been proved; yet Buddhist images, or at least many strikingly resembling them, have been found in Old Mexico and Central America.

Last fall I had the great pleasure of perusing Schliemann's "Ilios," published by Harpers in New York, and was wonderfully pleased with that singularly attractive work on ancient Troy, as revealed to him by his several years' labor on the hill of Hissarlik near the ancient Scamander. Nothing, however, pleased me so much as the extraordinary similitude between the ancient flint and stone weapons and the pottery of the lowest pre-historical cities unearthed by Dr. Schliemann and those we have both found and seen not only in the valley of the great Father of Waters which eddies by your beautiful town, but also in Colorado, Utah, New Mexico, and Arizona. While comparing the forms of pottery well delineated in the illustrated catalogue of the Bureau of Ethnology for 1881, drawn by Mr. W. H. Holmes, I was struck by the resemblance between Fig. 140 of the Ethnological Collection, pages 466-67, and the Buddhist signs of which



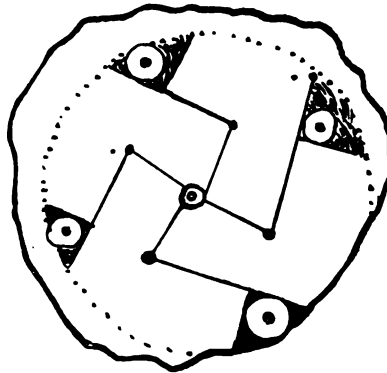
the Sanscrit name of Fig. 1 is "svastika," a sign of good luck, meaning "to be well," being No. 1 of the sixty-five auspicious signs of the footprints of the Hindoo God Buddha; while No. 2 represents a reversal of Fig. 1, the svastika, and ranks as the fourth sign of Buddha, and is called in Sanscrit "sauvastika." Dr. Schliemann is inclined to consider these figures, from the communication upon them from Max Mueller to him, as representing the vernal and autumnal sun. At all events, they were universally considered to be signs of good augury. Emile Burnouf thinks that these two signs represent the two pieces of wood which were laid crosswise before the altars to produce the sacred fire called "Ague," the ends of which were bent "at right angles and

fastened by four nails." In Fig. 140 of the Bureau of Ethnology we see "four dots also."

I have noticed portions of the "svastika" on fragments of pottery from New Mexico and Arizona, but as these fragments were imperfect I merely indicate this resemblance to stimulate further research in this curious matter. The figure 140 of the Ethnological Report, by Holmes, compares the shape as "of two rectangular tablets or slips, slit longitudinally and interlaced at right angles," \* \* "lines are \* \* deeply incised." The object was made of shell, and was found on Fain's Island, Tennessee.

Dr. Schliemann says these signs, the "svastika and sauvastika," are found in Europe, Asia, and Africa; that they are the same as the "sign of life" written on the forehead, as mentioned in Ezekiel, chapter ix., verses 4-6.

The universality of these signs cannot be ascribed to chance or the evolution of an imitation in ornament, and is suggestive in North America of a connection between their use and the rites, writings, and teachings of Hœi-schin and the other Buddhist missionaries in Mexico or California, which were finally, in the continual emigrations of the American tribes, their feuds and wars, scattered eastward by fragments of nations, or even whole emigrating tribes. Fig. 3 represents Fig. 140 of Ethnological Report of 1881.



*Fig. 3.*

*[Representing Fig. 140 from illustrated catalogue of Bureau of Ethnology, 1881. Pages 406, 407. W. H. Holmes.]*

While we present these facts to your attention as perhaps fit subjects for more critical examination and study by those who are more com-

petent to give a sound, critical opinion on such a momentous question, yet I would not have my friends of the Davenport Academy conceive that I give this subject simply as a curious coincidence, or as a piece of transcendental archæology. Believing the narration of the Chinese annals to be in the main part true, we cannot afford to entirely throw out any fact remotely bearing on this disputed point of Chinese discovery. We have certain evidence of the shipwreck of Chinese and Japanese ships upon the coast of Alaska, Oregon, and California as far back as nearly 150 years ago, so that the probability of the discovery of America's west coast at an early date is not so impossible. This, coupled with the zeal so well known to have been elsewhere displayed by Buddhist missionaries lends inferentially a great deal of strength to the claim of the Chinese annals. This discovery admitted, then the singularity of the resemblance between the marks on the carved shell and the Buddhist signs of Figs. 1 and 2 remains simply to be shown as such, saving any direct evidence that proves the carving as merely conventional or the work of chance.

Fig. 131 of the Report on Ethnology, 1881, gives a representation of a carved ornamental "shell gorget." The description on page 467 calls the center figure "a conventionalized figure of an insect resembling a spider." It may be that such was the idea of the carver, yet if we turn to Ilios, pages 337-338, and compare the figure of the Trojan "lead idol" and its description by Dr. Schliemann, there is a curious "rapprochement" between the navel and vulva marks of the "lead idol" and the marks and triangular figure at the base of the carved figure on the shell gorget.

Can all these singular affinities be relegated to chance or idle work? We cannot believe.

## ANCIENT GROOVED ROCKS IN ARKANSAS.

BY W. A. CHAPMAN.

CLARK COUNTY, ARKANSAS, abounds in much that is of interest to those who are engaged in deciphering records of the once powerful race that peopled the Mississippi Valley in times so long past that the records of their presence have become so obscure and so intermixed with those of later Indian races as to render the decipherment of such existing data as have a bearing upon the origin, characteristics, and disappearance of the builders of the mounds an exceedingly difficult task. Of these features (relating to this departed race) now open to our inspection, there are probably none more worthy of our attention, nor more perplexing in their nature, than the so-called incised or sculptured rocks. The rock which forms the subject of this paper is exposed to view on Sec. 18, Tp. 8, R. 22 W. (fifty feet from Gentry's Mill). Its texture is that of a coarse micaceous sandstone, difficultly frangible. The surface where ungrooved is smooth. The exposure is triangular in shape, and is 12 x 75 feet in extent, its greatest length being nearly N. and S. The east side and portions of the north project above the valley of the spring branch from one to three feet. The north and east sides are covered by a slight elevation. The exposed surface of to-day is undoubtedly much more extensive than when these groovings were made, as portions of the rock are so covered by these grooves as to render their forms obscure.

The groups as figured in the diagrams are *fac similes* of the most striking forms seen upon the rock. These, if taken singly, would appear to have been designed as symbolical; but when taken collectively with the various interjacent figures (not shown in the diagram) this methodical arrangement and appearance of design vanishes, and the confusion which prevails demonstrates that the forms are accidental and that the groovings which form them were a secondary and unsought for product of the labor of the artisan, whose sole endeavor had been to sharpen and polish his stone implements. Figs. 18 and 20 bear a marked resemblance to Fig. 6 as portrayed by T. H. Lewis in his "Ancient Rock Inscriptions in Eastern Dakota," and there is also a



and, without doubt, the same reasons led to the selection and utilization of the rock described by Lewis, for the same purpose, by the Mound Builders of Dakota. Convinced that the nondescript character of the forms would preclude their being accepted as symbolical, I sought for some method of determining the truth or falsity of my sur-



mises regarding the causes that led to their origin. Selecting a scraper and placing myself in position upon the ground, I proceeded to go through the motions of shaping, sharpening, and polishing it, after the same manner the Mound Builders must necessarily have followed in

order to give the implement its peculiar shape. The results of my labor were as follows: Length of stroke, ten inches; width of groove, two to two and one-half inches, the groove being deepest in the center of the stroke, where the greatest pressure was unavoidably brought to bear, and the ends sloping and rounded. Repeating the process without changing my position, a character corresponding to Fig. 3 was formed. Reversing the tool and resuming operations, Fig. 10 (having ends more acute than Fig. 3) was reproduced. Next selecting a large circular or semi-oval implement, I proceeded with the grinding as in the other instances, being governed in my operations not by a desire to reproduce the forms upon the rock, but by the shape of the implement. The result of this last operation corresponds with Fig. 8, the whole bearing a close resemblance to the pictographs upon the rock, differing from them only in length and width, and that but slightly. It will be seen by inspection that the complicated forms are simply the result of a grouping of the two primary or simple forms of designs, as Figs. 4, 8, and 15. Several repetitions of these simple forms, from a central point, governed by such slight changes in his position as the laborer would almost unconsciously assume for the purpose of rest or with a view to reach a fresh grinding surface, would naturally and almost unavoidably result in the production of such forms as Figs. 2, 3, 4, 7, 10, 16, and 17. Figs. 1, 11, 12, 13, 18, 19, and 20 are, perhaps, due to the efforts of several individuals laboring together. That these markings are not incisions, but the result of abrasion, is evident from the regularity of the form, the rounded outline of the ends, and the smooth and sloping finish of the interior of each.

**Biographical Sketch**

— of —

**Charles Christopher Parry.**

**1823 — 1890.**



**BIOGRAPHICAL SKETCH OF DR. C. C. PARRY.**

BY C. H. PRESTON, M. D.

*(Read before the Davenport Academy of Sciences, September 15, 1893.)*

ON the twentieth of February, 1890, there died at his pleasant home near this city, one to whom the Davenport Academy of Sciences was deeply indebted, and whose memory, fragrant and pure as the flowers he loved, it will ever cherish.

At that time the working force of our Association had been almost paralyzed by recent sad losses; the publication of its PROCEEDINGS was for a time deferred, and so it happened that he who was always ready with an appreciative tribute to the memory of associate or friend, has waited thus long for an expression from this, his home Society, of the admiration and esteem which each and all of its members entertained for him. It is to be regretted that there was not found among us some co-laborer in his own field of botanical science to prepare a sketch of Dr. Parry's life and work—an undertaking for which the writer is qualified only by warm personal friendship and long association in the affairs of this Academy. Deficiencies which must in consequence of necessity exist will, however, in part be made good by citations from those better qualified to speak.

Charles Christopher Parry was born in the hamlet of Admington, Gloucestershire, England, August 28, 1823. Descended through a long line of clergymen of the Established Church, he was himself of a deeply religious nature, and rarely endowed with that poetic feeling and insight so apt to characterize the true naturalist.

In 1832 the family removed to America, settling on a farm in Washington County, New York. Here the remainder of his boyhood was passed, and, the advantages of the schools of the locality having been well improved, he entered Union College at Schenectady, and in due time was graduated therefrom with honors. He began the study of medical botany in his undergraduate years, and subsequently received the degree of Doctor of Medicine from Columbia College.

Coming West and to Davenport in the fall of 1846, he entered upon the practice of his profession, but continued in it for a few months only, very soon discovering that all his natural tastes and instincts led directly away from the unreason, the too often self-inflicted ills, and the petty conflicts with which the active physician has perforce to deal—led him to the unvexed, blossoming solitudes where Nature, silent and orderly, works out her fair results.

His earliest collecting had been done in the attractive floral region about his home in North-eastern New York, in the summer of 1842 and the four years following; and now again, attracted to this more congenial work, we find him employing much of the season of 1847 in making a collection of the wild flowers about Davenport, of which, with the dates of finding, he has left a manuscript list. Those of us who knew him well in after years can readily picture the brisk, dark-complexioned, though blue-eyed youth, symmetrically but slightly built and somewhat below the medium height, in his solitary quest by river-side and deep ravine, over wooded bluff and prairie expanse, for the treasures which were more to him than gold—for such early friends as “the prairie primrose, the moccasin-flower, and the gentian,” which in later years he complained had been quite driven out by “the blue-grass and white clover.”

In the course of that summer, also, he accompanied a United States surveying party, under Lieutenant J. Morehead, on an excursion into Central Iowa, in the vicinity of the present State capital. From this time on (except for a short time while connected with the Mexican Boundary Survey, when he discharged the duties of Assistant Surgeon), the physician was merged in the naturalist. He was almost continuously in the field collecting, but Davenport remained his home. Here, in 1853, he was married to Miss Sarah M. Dalzell, who, dying five years later, left with him an only child, a daughter. But she, too, a fair, unfolding flower, was claimed by death at an early age.

In 1859 he was married again, to Mrs. E. R. Preston of Westford, Connecticut, who, through the more than thirty years of their union, entered helpfully into all his work and plans, assisting him in his study and often accompanying him to the field, and who is left to mourn the loss of one who, in every relation of life, was exceptionally unselfish and kind. Of his two brothers and six sisters only two remain, viz.: Joseph Parry and Mrs. Charles

Pickering, both of Davenport, beside a half-sister, Mrs. Austin, residing in Arkansas.

We are fortunate in possessing, in Dr. Parry's own words (PROC., Vol. II., p. 279), a succinct, chronological account of his work up to 1878, which need not be repeated here. Suffice it to say that for more than thirty years the greater part of his time had been spent in observing and collecting—along the St. Peters and up the St. Croix; across the Isthmus to San Diego, to the junction of the Gila and Colorado, along the Southern boundary line and up the coast as far as Monterey; through Texas to El Paso, to the Pimo settlements on the Gila, and along the Rio Grande; in the mountains of Colorado, to which and to those of California he returned again and again in the pursuit of his special study, the Alpine Flora of North America; across the continent with a Pacific railroad surveying party by way of the Sangre de Christo Pass, through New Mexico and Arizona, through the Tehachapi Pass, through the Tulare and San Joaquin Valleys to San Francisco; through the Wind River district to the Yellowstone National Park; in the Valley of the Virgen and about Mt. Nebo, Utah; about San Bernardino, California, and in the arid regions stretching to the eastward; and in Mexico about San Luis Potosi, Saltillo, and Monterey.

The winter of 1852-3 was spent in Washington, in the preparation of his report as Botanist to the Mexican Boundary Survey; and the years from 1869 to 1871 inclusive, while Botanist to the United States Agricultural Department, were also passed chiefly at the capital, employed in arranging the extensive botanical collections from various government explorations, which had accumulated at the Smithsonian Institution. During this period, also, he visited, in his official capacity, the Royal Gardens and herbaria at Kew, England, and was attached as Botanist to the Commission of Inquiry which visited San Domingo early in 1871. The report of his observations in that island is a valuable summary of its chief botanical features, vegetable products, and agricultural capacities.

His visit to Kew and the land of his birth was the beginning of a lasting friendship between himself and the eminent Sir Joseph Hooker, Director of the Gardens, who afterward in a congratulatory letter dated February 27, 1877, calls him "already king of Colorado botany," and expresses deep interest in the results of his explorations, then making, in Southern California.

Subsequent to 1878, the date of the autobiographical sketch before mentioned, his work, although arduous and important, may be briefly summed up as follows:

In 1879, being called to the East by the illness and death of his father, he did little if any work in the field. In 1880, as special agent of the Forestry Department of the United States Census Office, he accompanied Dr. Engelmann and Professor Sargent in an expedition to the Valley of the Columbia and the far Northwest. Wintering in California he spent the following year in that State, making numerous collecting trips North and South, including a trip to the Yosemite in June. Home again in the summer of 1882, he was busily employed for some months in arranging his collections and on work for our Academy PROCEEDINGS. In the fall of that year he returned to California, and passed the winter in San Diego.

In January and February, 1883, he made two camping trips into Lower California; then, going to San Francisco, made numerous excursions from that point, and returned to Davenport in September. In June, 1884, he sailed a second time for England, returning in August of the following year, after spending much time at Kew, and visiting other herbaria and gardens on the Continent.

The summer of 1886 he spent partly with friends in Wisconsin, partly in the quiet enjoyment of his Iowa home. But even when resting, his mind did not rest—his wonderfully voluminous correspondence went on, and the microscope filled in his otherwise leisure hours. Again the winter was passed in San Francisco, from which city he made numerous collecting trips as before. Remaining in California, chiefly in the vicinity of San Francisco, until September, 1888, he was busily employed making special collections of *Arctostaphylos* and *Ceanothus*, and in the study of these and the Genus *Alnus*. His last visit to California was made in the spring of 1889. Returning to Davenport in July, he made a trip to Canada and New England, visited New York and Philadelphia, and returned to his home but a few weeks before his death.

Most intimately connected with the botany of the Pacific Coast; "treading reverently in the steps of Chamisso, Douglas, Nuttall, and others of less note," who, at such accessible points as San Diego, Santa Barbara, Monterey, and the mouth of the Columbia, had, at an early day, preceded him, he greatly extended their labors.

"None of the early investigators," says a writer in the *Century*

*Magazine* (Oct., 1892), "was more typical than the late Dr. C. C. Parry, who first crossed the country with the Mexican Boundary Commission. At intervals, for forty years after, he was a familiar figure to hunters, prospectors, mountaineers, and all sorts of outdoor people, from the Arizona deserts to the Siskiyou pine forests."

Dr. Parry was recognized as an authority by botanists everywhere; not only in this country (where he ranked with the first) and in England, but on the Continent as well; and this notwithstanding the fact that he never published a book, had no ambition in the way of authorship, and left most of his discoveries to be described by others. His writings, though sufficient to constitute volumes, and comprising much of great scientific value, are scattered in fragmentary form through various government and society reports, scientific journals, and the daily press. A list, approximately complete, will be published in connection herewith.

In 1875 he was made a fellow of the American Association for the Advancement of Science, in which body his membership dates back to 1851. He kept up a corresponding membership in the Philadelphia, Buffalo, St. Louis, Chicago, and California Academies of Science, and was connected with various other organizations, among them the Philosophical Society of Washington, D. C., the Bay District Horticultural Society of California, and the State Historical Society of Iowa. Of our own Academy he was, from the start, a most active promoter and one of the main supports. Its welfare was a matter of constant solicitude with him, and to his valuable papers, published in our PROCEEDINGS, the Academy's favorable recognition abroad is in great part due. Although absent in Arizona at the time of its organization, he was made a member of the first Board of Trustees, and continued in that capacity as long as he lived. On the resignation of our first President, Prof. Sheldon, in 1868, Dr. Parry was chosen to succeed him, and reëlected again and again, until, in 1875, he declined longer to retain a place from which, and its duties, he must of necessity be much of the time absent. As a member of the Publication Committee from its inception, his counsel and assistance were invaluable, as indeed they were, while he lived, in the Academy's every undertaking.

Wholly free from that jealous self-seeking which too often mars genuine merit, his relations with his fellow-workers, whether tyros or masters in the science, were always of the pleasantest. The

veteran botanist, Prof. John Torrey of Columbia College, to whose assistance and encouragement, from the time of their first acquaintance in 1845, he acknowledged himself deeply indebted, was his warm personal friend through life. Of their last living interview, which occurred in September, 1872, shortly before Torrey's death "full of years and honors," Dr. Parry writes in an obituary notice prepared for this Academy: "It was my privilege to entertain this distinguished guest at my rude botanical retreat in the heart of the Rocky Mountains. Here, in close proximity to my cabin, I could point out to him many of the living plants that he had described fifty years previously, from herbarium specimens, but had never before seen in their living beauty." Owing to the early severity of the season at the time of this visit, Dr. Torrey was prevented from making the ascent of the peak to which his name had been given by his host and friend, although permitted "to gaze on its sky-piercing summit and to snatch from its wintry slopes some late-grown floral mementos of his early labors." Of this and its companion peak, Mt. Gray, Dr. Parry says: "In my first botanical exploration of the Rocky Mountain region of Colorado, in 1861, I applied the name of 'Torrey and Gray' to twin peaks which, from a distant view, had often attracted my attention. In the year following I succeeded in reaching the summit of the eastern peak, now well known as Gray's Peak, and determined its elevation by barometric observation. Two years afterward, in 1872, I stood for the second time on the same elevation, accompanied by Prof. Gray himself and a large party of acquaintances. In response to some appropriate resolutions on this occasion, Prof. Gray, pointing to the closely-adjointing western peak, expressed the earnest wish, seconded by all present, that it should continue to bear the name first affixed—of Mt. Torrey—in worthy commemoration of his early and valued scientific associate."

It was Dr. Parry's pleasant privilege also to give its name to Mt. Guyot, in honor of his friend, Prof. Arnold Guyot of Princeton. His own name (bestowed by Surveyor-General F. M. Case) is borne by a peak of the Snowy Range, to the north-west of Empire City. Farther removed from the abodes of men, retiring yet not inconspicuous, it stands amongst its fellows, an enduring and a fitting monument to him whom his friends knew as "good Dr. Parry."

Not less close than with Torrey and Gray were his relations with

Dr. George Engelmann of St. Louis, whose death occurred in 1885. "Since my first acquaintance with him, in 1848," he writes, "when I called on him at St. Louis before starting on my first exploring trip with Dr. D. D. Owen in the then Northwest, our friendly intercourse has been constant, and the letters received from him would make up a respectable volume. How much I owe to his wise counsels, his substantial encouragement, and not less to his sharp criticisms (always well-meant), I can now best realize by feeling their loss. He knew just what to look for, and, when seen, he also knew its significance in elucidating the system of nature." This was not less true of Dr. Parry himself.

Torrey, Gray, Engelmann, Parry! What were American botany but for these four co-laborers whose work and fame are inseparably interlinked?

Dr. Parry was essentially a field student, and the general accuracy of his conclusions is largely due to the fact that his observations were all made at first-hand: to this and to the thoroughness of his determinations, which were based on careful dissections of all accessible fruit, as well as of the flowering specimen; so that he was generally able, as he declared, to discriminate species by the fruit alone.

Industrious and indefatigable, "the bulk and value of his collections have probably not been equalled in America." (I quote from the Bulletin of the Torrey Botanical Club.) Beside contributing largely to the collections of his botanical friends and of various societies at home and abroad, he made for himself one of the finest private herbaria in the land, a collection, systematically classified and arranged, comprising over 18,000 determined specimens representative of nearly 6,800 species, together with some 1,400 specimens determined only as far as the genus. But while himself thus chiefly occupied in collecting from untrodden heights and tangled wilds, he recognized "with respect and reverence" the magnitude of the task assumed "by those masters of botanical science who have taken upon their broad shoulders the burden of a systematic arrangement of the whole vegetable kingdom."

Appreciating the beautiful as he did wherever found, and especially as embodied in floral and arboreal forms, Dr. Parry was yet, for a naturalist, markedly utilitarian. Wherever he went, in whatever he did, his eyes were open to the practical. The plant, the tree which gave promise of usefulness was to him doubly interesting, and he spared no pains to obtain for such the recognition they

deserved. To bring the Mexican rose into cultivation, for example, he made an extra trip into Lower California. He was at especial pains to introduce the remarkable *Spiræa cæspitosa* or "tree-moss," found in the Wasatch Mountains, of which he writes: "The peculiar adaptation of this plant for ornamental rock-work can be appreciated by those who have seen it in its native haunts, and it is hoped that from plants and seeds somewhat copiously collected it may eventually find a much larger number of admirers in gardens devoted to this charming class of horticultural adornments." Every region he explored was viewed not alone with the botanist's searching eye, but was studied as well in its topographical and climatic aspects, as affecting its economic possibilities.

Of his careful work in the field we have pleasant glimpses in the notes of his first Pike's Peak expedition. At the close of each day's toilsome journey we see the earnest student seated by the camp-fire, note-book in hand, tracing a map of the route just passed over and recording its general features—topographical, geological, botanical—in simple, terse narrative, with scarcely a word interlined or erased. As he said of his lamented young friend and associate, J. Duncan Putnam, who accompanied him on more than one toilsome expedition, "with him the truths of nature were serious matters."

The conscious possessor of a talent for observation, he used it reverently; taking careful account of what so many would have suffered to pass unseen or fade into forgetfulness. Nor was he content to be simply receptive, but interrogated Nature continually. Often, intent on some all-absorbing quest, he would disappear from camp for a day or more at a time, still however, with the woodsman's unerring instinct, reappearing safe and sound.

Yet, curiously exemplifying the absorption of the naturalist in other than the affairs of his fellow-men, these notes contain no mention of his traveling companions, nor of any of the unique and interesting specimens of Western humanity with which he was continually coming in contact. The most warm-hearted, unassuming, and genial of men; one whose learning and humility were alike delightful, whose nature reflected the sweetness of the flowers he loved, and who was welcomed to every fireside; one of whom, as of Agassiz, it may truly be said:

"where'er

He met a stranger, there he left a friend,"

he yet made no study of man as man, caring only for hearty companionship, the warm greeting, and fervent God-speed.

Deeply affectionate, almost extravagantly fond of children, and with a sense of humor which often sparkled in his home conversation, he was yet so reticent that only the intimate few were aware of these traits in his character. With no expensive habits and almost no wants save knowledge, he looked on money as of value chiefly for the amount of this it could procure and diffuse. Devoted not only to his own special study but to Natural Science in general as a too much neglected part of the great educational field, he lost no opportunity to support its claims as against the dull abstractions of unused tongues and all exclusively text-book instruction.

Of his scientific achievements I will leave those to speak who shared in and were conversant with his labors.

Prof. J. G. Lemmon—with whom he explored the San Bernardino Valley, and in whose pleasant home, in the quietude of his herbarium, Dr. Parry's last days in California were spent—after paying a feeling tribute to the memory of his friend, thus sums up his western coast work:

“Dr. C. C. Parry was most intimately connected with the flora and the botanists of California. Since his early explorations on the coast near San Diego, in 1849, the Doctor has made several brief visits to different regions of the western slope, intent upon some special discovery or study. During one visit it was the curious little sand plant, the *Chorisanthus*, that caught his keen eye and secured his careful discrimination. Another visit was devoted to the *Alders*; another to the *Cacti*; etc.

“In 1882 Dr. Parry traveled well over the Pacific slope, studying the interesting family of *Arctostaphylos* or ‘Manzanita,’ publishing the following year, in the PROCEEDINGS OF THE DAVENPORT ACADEMY OF SCIENCES, a monograph which cleared away much of the misconception and ambiguity that has all along encumbered our botanical literature, by showing that there were several distinct forms mingled in previous descriptions. A second monograph, read before the California Academy of Sciences, June 20, 1887, still further elucidated the subject, and the two papers cited complete our knowledge of the California manzanitas, Dr. Parry having detected and described therein six new species, besides determining the proper limits of the other nine.

“Later, in 1887 and 1888, he performed like excellent services in the examination of our *Ceanothus* family, many species of which form our coast chaparral, while others constitute the valuable forage plants called ‘tea bushes’ or ‘deer brush’ in the interior mountain regions. In two able monographs, published February and August, 1889, he has cleared up the mass of confusion in this

genus, while detecting a half-dozen new species and defining the twenty-six remaining ones."

C. R. Orcutt, editor of the *West American Scientist*, writes:

"Dr. Parry discovered during his extensive explorations hundreds of new plants afterward described by Dr. Gray and by Dr. Engelmann, and his name is firmly fixed in the history of West American botany. While his greatest service has been rendered to botanical science, yet horticulturists will not soon forget that it was Dr. Parry who discovered *Picea pungens*, the beautiful blue spruce of our gardens; *Pinus Engelmanni*, *Pinus Torreyana*, *Pinus Parryana*, *Pinus aristata*, and a host of others of beauty and value. Through his zeal and enterprise many plants now familiar to American and European gardens were first cultivated. *Zizyphus Parryi*, *Phacelia Parryi*, *Frasera Parryi*, *Lilium Parryi*, *Saxafraga Parryi*, *Dalea Parryi*, *Primula Parryi*, and many other plants of great beauty or utility bear his name in commemoration of his labors and worthily do him honor.

"No name is more intimately connected with the flora of West America than is the name of Charles Christopher Parry. For nearly fifty years his indefatigable labors and explorations in the West have enriched our botanical lore. His name is associated with many pleasant memories in the mind of every one who was so fortunate as to know him personally. Since 1882 he has published very important papers on the species of *Chorizanthe* on the Pacific Slope; on the genus *Arctostaphylos* (the manzanita); on Pacific Coast Alders; and, later, on the genus *Ceanothus*, which contains the numerous mountain and coast shrubs known as 'wild lilacs.' These papers were the result of special studies in the field of these difficult groups of plants and contained descriptions of many new species."

In the vicinity of San Diego, in 1882, as Mr. Orcutt further relates, "he rediscovered the little fern *Ophiglossum nudicaule*, which he had first found in 1850, and which ever since had been unseen. In the neighborhood of Todos Santos, or All Saints Bay, were discovered the new *Ribes viburnifolium*, Parry's Mexican rose (*Rosa minutifolia*, Engelm.), and a dwarf horse-chestnut (*Aesculus Parryi*) among other new plants;" also, later, in the same region, "the new spice bush (*Ptelea aptera*, Parry)." The Parry lily (*Lilium Parryi*, Watson) was discovered in 1876 on the rancho of the Ring brothers in Southern California, near San Geronimo Pass.

Dr. Parry's work on earth is done. His was a busy, useful life; unselfish, but crowned with the proudest success. His name "has been stamped upon the mountain peak and traced in lines of beauty in many a mountain flower." At last the gathering hand has been

gathered; the wandering feet have brought him back to lie down on the green hillside within sight of the home he loved; to rest under fragrant, clustering flowers, where in years long past he was wont to seek their shy, wild sisters. They and he are gone;—but, let us trust with his friend, the prose poet of the Yosemite, “he has but gone botanizing in a better land.”

Over his grave, through the years to come—

“Swing, O flowers, your bells of bloom!  
Deep below as high above  
Sweeps the circle of God's love.”

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BY MRS. C. C. PARRY.

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General Geological Features of the Country. Vol. I., Pt. II., p. 1.

Geological Features of the Rio Grande Valley from El Paso to the  
Mouth of the Pecos River. Vol. I., Pt. II., p. 49.

**Report of a Geological Survey of Wisconsin, Iowa, and Minnesota.**

By David Dale Owen.

Systematic Catalogue of plants of Wisconsin and Minnesota. 1848.  
Art. V., p. 606.

**Reports of the U. S. Department of Agriculture.**

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Royal Gardens at Kew, etc. 1870, p. 108.

Botanical Explorations in East Tennessee. 1871, p. 221 (?).

Cinchona Planting in Jamaica. 1872 (?).

**Report of Kansas Pacific Railway Survey. 1867-8.**

Preliminary Report, and Extract from Detailed Report, as Geologist  
and Naturalist. P. 196 and p. 213.

**Report of the Commission of Inquiry to the Island of Santo Domingo. 1871. Forty-second Congress, First Session, Senate Executive Document No. 9.**

Report on the Botanical Features, Agricultural Products, and Timber  
Growth of the Peninsula of Samana, San Domingo. P. 71.

Botany of the Southern District of Santo Domingo. P. 86.

**Proceedings of the American Association for the Advancement of Science.**

The Habitative Features of the North American Continental Plateau  
near the Line of the Thirty-ninth Parallel of North Latitude.  
Vol. XVII., p. 312.

The Rocky Mountain Alpine Region. Vol. XVIII., p. 248.

On a Form of Boomerang in Use Among the Moqui Pueblo Indians of North America. Vol. XX., p. 397.

Report of the British Association for the Advancement of Science.

North American Desert Flora between 32°-42° North Latitude. Vol. XL., p. 122. (Published also in The Journal of Botany, Vol. VIII., p. 343.)

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Supplement I. to Enumeration of Plants of Dr. Parry's Collection in the Rocky Mountains, *Coniferae*, by Drs. Parry and Engelmann.

Botanical Gazette.

On Some Recent Notes and Descriptions of *Eriogonae* in Proceedings of California Academy of Science (Vol. XI., No. 3). Vol. II., p. 54.

Iowa Instructor and School Journal.

Claims of Natural Science as a Branch of Mental Education. Vol. I., (1859) Nos. 3, 4, 5, 6, 7, 8, 9

Evil Effects Resulting from an Improper Association of Educational Interests with Party Politics. Vol. II., No. 2.

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Rancho Chico. June, 1888.

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Valedictory Address. Vol. I., p. 19.

Annual Address. Vol. I., p. 67.

Annual Address. (Omitted from Vol. I.) Vol. II., p. 355.

Obituary Notice of Prof. John Torrey. Vol. I., p. 44.

Notice of the late I. A. Lapham. Vol. II., p. 29.

Biographical Sketch of the Late J. Duncan Putnam. Vol. III., p. 255.

Obituary Notice of Dr. John Le Conte. Vol. IV., p. 230.

Obituary Notice of Dr. George Engelmann. Vol. IV., p. 242.

Memorial of Prof. David S. Sheldon. Vol. V., p. 179.

Early Reminiscences of Richard Smetham. Vol. V., p. 205.

Ode on Laying the Corner-stone. Vol. II., p. 178.

- On Depositing the Parry Botanical Collection. Vol. II., p. 279. (Autobiographical.)
- Summer Botanizing in the Wasatch Mountains, Utah. (A letter addressed to Prof. Asa Gray.) Vol. I., p. 145.
- A New California Lily. Vol. II., p. 188, plates 5, 6.
- Oxytheca*. Two New Species from Southern California. Vol. III., p. 174.
- Arctostaphylos*, Adans. Notes on the United States Pacific Coast Species, Including a New Species from Lower California. Vol. IV., p. 31.
- New Plants from Southern and Lower California. Vol. IV., p. 38.
- Chorizanthe*, R. Brown. Revision of the Genus, and Rearrangement of the Annual Species — with one exception, all North American. Vol. IV., p. 45.
- Harfordia*, Greene and Parry. A New Genus of *Eriogonææ* from Lower California. Vol. V., p. 26.
- Lastarriaea*, Remy. Confirmation of the Genus, with Character Extended. Vol. V., p. 35.
- The North American Genus *Ceanothus*, with an Enumerative List, and Notes and Descriptions of Several Pacific Coast Species. Vol. V., p. 162.
- Chorizanthe*, R. Brown. Review of Certain Species Heretofore Improperly Characterized or Wrongly Referred; with two New Species. Vol. V., p. 174.
- Ceanothus*, L. Recent Field Notes, with a Partial Revision of Species. Vol. V., p. 185.

#### Transactions of the St. Louis Academy of Science.

- Ascent of Pike's Peak. Vol. II., No. 1.
- Notice of Some Additional Observations on the Physiography of the Rocky Mountains, Made During the Summer of 1864. Vol. II., No. 2, p. 272.
- Account of the Passage Through the Great Cañon of the Colorado by Mr. James White in 1867, with Geological Notes. Vol. II., No. 3.
- On the Timber Vegetation of the Rocky Mountains. (A paper referred to in the President's Annual Address, Vol. II., p. 582, but which may not have been published.)
- On the Character of Persistent Snow Accumulations in the Rocky Mountains — Latitude 40°-41° N.—and Certain Features Pertaining to the Alpine Flora. Vol. II., No. 3, p. 532.

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A New North American Rose. Vol. IX., p. 97.

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#### West American Scientist.

New Genus of *Euphorbiaceæ* from Lower California. Vol. I., p. 13.

Notes on *Chorizanthe Lastarriza*. Vol. I., No. 5.

Historical Notice of *Pinus Torreyana*. Vol. I., No. 6.

A New Species of *Eriogonum*. Vol. VI., No. 47.

#### American Naturalist.

Visit to the Original Locality of the New Species of *Arceuthobium* in Warren County, N. Y. Vol. VI., p. 404.

Botanical Observations in Western Wyoming, with Notices of Rare Plants and Descriptions of New Species Collected on the Route of the Northwestern Wyoming Expedition under Captain W. A. Jones. Vol. VIII., pp. 9, 102, 175, 311. Reprint, 25 pages.

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DAVENPORT, IOWA, September 15, 1893.

## SUMMARY OF THE ARCHÆOLOGY OF IOWA.

BY FREDERICK STARR, PH. D.

It is now several years since I planned the work of which this is a part. As a student, in Iowa, of Iowa archæology, I believed that a systematic work carefully outlined might be carried out with profit. As the plan shaped itself it comprised five separate pieces of work:

(a) Preparation of a *bibliography*, that workers might know where to look for the literature.

(b) Publication of a *summary*, that those interested, who do not have access to libraries, may know what has been done.

(c) Organization of exploration in every part of the State; collection of data, diagrams, plans; making of a working-map, showing the location of mounds, shell-heaps, trails, village sites, etc.—in other words, *field-work*.

(d) *Publication* of a final report of the work done under such organization, and a separate publication of the map worked out by the exploration.

(e) Preparation of a pamphlet of illustrations of "Iowa types" of archæological specimens and of a series of plaster copies and models of remarkable specimens, mounds and the like, for distribution to universities, high schools, colleges, and scientific and historical societies within the State. This *educational* work is the most important and significant part of the whole plan, and can only be done well after the other parts have been performed.

How far this plan is to be realized remains to be seen. The Bibliography has been printed; the Summary is here presented. By a wide distribution of this through the State it is hoped that a body of helpers and co-workers may be raised up to work under direction toward definite ends. Persons interested are urged to write to the Academy for advice and for fuller statement of plans.

Very many individuals have helped the author in the preparation of the Bibliography and in this Summary both by criticism, supply of material, and by loan of prints; to all such we give thanks.

The following corrections should be made in the Bibliography (PROC. D. A. N. S., vi., pp. 1-24):

In No. 16, for pp. 263-281 read pp. 265-281.

[PROC. D. A. N. S., VOL. VI.]

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[February 9, 1895.]

- In No. 23, for Vol. ii. read Vol. iii.  
 38, for pp. 9, 13 read pp. 4-5.  
 50, for p. 266 read p. 267.  
 63, strike out word *nine*; add *sums up work of 1880*; read Vol. iii., not Vol. ii.  
 64, this should be same as No. 71.  
 71, for pp. 140-146 read *for 1881*.  
 75, for John J. read John G.  
 81, for Barber read Barker.  
 85, add *and South-eastern Minnesota*.  
 93, in place of reference given, read *Zeitschrift für Ethnologie*, 1886, pp. (194) (195).  
 101, is part of No. 185.  
 106, for p. 106 read p. 107.  
 115, for p. 246 read p. 247.  
 139, Title, "*Antiquities of Missouri Bluffs*." Add *Read before Iowa Academy of Sciences, Des Moines*.  
 144, for No. 172 read No. 170.  
 157, for Mercer County read Iowa.  
 162, for No. 23 read No. 44.  
 171, for Vol. vi. read Vol. vii.  
 172, for No. 94 read No. 144.  
 179, for Vol. v. read Vol. vi.  
 181, for 1887 read 1886, pp. (322) (328).

Also, add the following titles and numbers: (The author has not seen articles thus marked \*).

206. AMERICAN ANTIQUARIAN. 1885, vii., p. 253.  
 Speaks of Henshaw on Mound-Builders' Art.
207. ARCHÆOLOGIST. 1894, ii., p. 282.  
 Refers to skeletons and relics found at Sioux City.
- \*208. CHART OF IOWA AND WISCONSIN: GEOGRAPHICAL, GEOLOGICAL, AND STATISTICAL. Philadelphia, 1838.  
 Refers to Iowa Mounds.
- \*209. COLUMBUS JUNCTION HERALD. 1876.  
 Articles on Toolesboro and other mounds.
210. EVANS, S. B. *Proc. Congres Int. des Americanistes*, 1890,  
 [pp. 498-506.  
 "On Some Claims of the American Indians." Attacks Bureau of Ethnology theory of Mound-Builders.
211. HERMANN, RICHARD. *Personal Letter*.  
 Describes relics from Dubuque County.

212. HOLMES, WILLIAM H. *Bureau of Ethnology, Third Annual*  
[*Report*, 1881-2, pp. 397-423.  
"Prehistoric Textile Fabrics," etc. Refers to Iowa speci-  
mens: pottery on p. 417, celts on p. 411.
213. LEWIS, T. H. *The Archaeologist*, 1892, ii., pp. 85-89.  
"Effigy Mounds near Aurora, Ill." On p. 87 refers to dis-  
tribution of effigies in Iowa.
214. MORGAN, BENJAMIN. *Cedar Rapids Gazette*, Oct. 14, 1887.  
"The Mound-Builders." Mentions Iowa mounds generally,  
but gives some detail regarding mound in Keokuk County,  
containing "burial urns," and one in Warren County,  
containing many skeletons.
215. DE NADAILLAC, MARQUIS. *Materiaux pour l'histoire, etc.*,  
[1885, pp. 497-517.  
"Les Pipes et le Tabac." Figures and describes some Iowa  
pipes.
216. PEET, STEPHEN D. *American Antiquarian*, xvi., p. 93 *et. seq.*  
"Craft Symbols and Religious Emblems." Refers to Iowa  
pipes on pp. 93-94.
- \*217. POLK COUNTY, CENTENNIAL HISTORY OF. Des Moines,  
[1876.  
At pp. 15-16 refers to earth-works on site of old Fort Des  
Moines.
218. PRATT, WILLIAM H. *Proc. Davenport Acad.*, ii., p. 154.  
"Exploration of Mound 1 on Allen Farm."
219. ——— *Proc. Davenport Acad.*, iii., pp. 90-91.  
"Exploration of mound on Allen Farm." The last mound  
of the series explored. Some bones and a few relics.
220. THOMAS, CYRUS. *The Cherokees in Pre-Columbian Times*,  
[16mo., pp. 97.  
Refers on p. 78 to Allamakee County enclosure; on p. 81 to  
pipes; on p. 83 to East Iowa mounds; on p. 89 to customs  
in region.
221. ——— *12th Annual Report Bureau of Ethnology*,  
[1890-1891.  
"Report on the Mound Explorations of the Bureau of Eth-  
nology." On pp. 38-39 he describes the Lyon County

mounds and circles; p. 553 refers to varied character of Scott County mounds; pp. 99-112 treats specifically of Iowa archæology. Works in Allamakee, Clayton, Dubuque, Wapello, Van Buren, and Lee Counties are described.

- \*222. WEBSTER, CLEMENT L. *Nature*, Jan. 1, 1891.  
The same probably as No. 185.  
This author has written many newspaper articles, the contents of which were afterward republished in the various articles referred to in the Bibliography.
- \*223. WHINERY, S. C. *Iowa State Register*, August, 1883.  
"The De Soto Mounds."
224. WITTER, F. M. *American Geologist*, ix., p. 276.  
Describes lōess at Muscatine; its organic remains and two arrow-heads and some flint chips.

In this Summary we aim at definiteness. Many articles upon Iowa Archæology are so vague as to have no value. The arrangement of material is, for convenience, in the alphabetical order of County names.

#### ADAMS COUNTY.

Thomas <sup>174</sup> lists a mound on the Thompson farm, near *Corning*.

#### ALLAMAKEE COUNTY.

Thomas <sup>169, 173, 174</sup> describes works seven miles above *New Albin*, on the Upper Iowa River. They are located upon a bluff, lying in a bend of the stream, and bordering a bayou — no doubt an old river channel. The top of the bluff is roughly rectangular. The northernmost, largest structure is an enclosure quite exactly circular, except on the east, where it conforms to the line of the bluff. At the southeast the ends overlap somewhat, leaving an entrance-way between them. A ditch within borders the embankment from the entrance on the south to the point where the circular part is broken by the bluff-line. The dimensions of the earthwork are—diameter from N. to S. outside to outside, 277 feet; diameter, E. to W. outside measures, 235 feet; circumference, 807 feet; part along the bluff, 100 feet; entrance overlap, 45 feet; the wall is quite uniform, with a height of about 4 feet and a width of 25 to 28 feet; the entrance is 16 feet wide; the ditch is 5 to 6 feet wide and 3 feet deep. At the north an excavation adjoins the wall; it is about 100 feet long, 35 feet wide at widest part, and 3 feet deep.

ALLAMAKEE COUNTY—*Continued.*

The circular embankment is composed chiefly of yellow-brown clay; this is covered with drifting sand and an accumulation of bones, river-shells, stone chips, potsherds, dirt, etc. A trench across it showed in section about 1 foot of sand, then from 1 to 2 feet of refuse matter, then the embankment proper 2 feet in height. Nearly all the implements found were of stone and very rude, little more than flakes with one sharp edge; a few arrow- and spear-points were found. Many charred bones of fish, birds, rabbit, fox, bear, wolf, elk, and deer occur in the refuse.—— Alexander <sup>2</sup> describes the same enclosure, and mentions from the locality a pottery vessel with ornamental markings. This measured at mouth, 14 inches in diameter; at widest, 26 inches. It had handles at each side. He also mentions two specimens of copper, one a thin strip 2 inches long and  $\frac{3}{4}$  inch wide, and the other a triangle 1 inch wide at base and  $1\frac{1}{2}$  inch along the side, with centre and base perforated.—— Thomas <sup>169</sup> thinks the enclosure represents two stages of occupation: (a) as a palisaded fort, (b) as a village site.—— Both Thomas and Alexander describe other structures in the group—squarish enclosures to the south and south-west of the great circle, and many mounds. Of the latter Alexander speaks of eighty-three, Thomas says over one hundred, and appears to recognize an arrangement in six nearly parallel lines running north-east and south-west. The former author states that they continue to be found along the river to about twenty miles above New Albin. Thomas <sup>173</sup> describes the mounds as being mostly circular, from 15 to 40 feet in diameter and from 2 to 6 feet high; a few are oblong, from 50 to 100 feet in greatest diameter.—— Certain barren spots on the plateau proved to be burial places, among which were scattered stone chips, shells, charcoal, and ashes. They were seldom more than 18 inches deep, and on excavation show a compact layer of hard, light-colored earth, perhaps mixed ashes and clay, subjected to action of fire. These were covered with sand from the butte.—— In section, the mounds themselves show, first a layer of soil, then the hard, light-colored layer, then the skeletons. Bones were numerous, both in the barren places and in the mounds, sometimes mingled with charcoal and ashes, but usually as horizontal skeletons at a depth of from 1 to 3 feet. The long mound,

ALLAMAKEE COUNTY—*Continued.*

No. 1 in the east line, contained an oblong pile of sandstone near the centre; beneath it was a rude stone coffin, of slabs, 6 feet long and 18 inches wide. This contained a skeleton, extended with head to the west, badly decayed; also stone chips, rude scrapers, a valve of unio, and potsherds. On the sand butte near by, which is about 100 feet in height, are three mounds like the rest in structure. Three mounds within the smaller, squarish enclosure to the south-west of the great circle were opened.

Elsewhere, Thomas <sup>221</sup> describes the square earthwork on the south-west corner of the plateau, on the margin of the bluff, facing west. The wall, which is from 12 to 15 feet wide and from 2 to 4 feet high, surrounded three sides of a square, and measures on the north, 200 feet; on the east (where it is ditched on the outer side), 150 feet; on the south, 175 feet. About thirty feet east of the north-west corner is an excavation about 3 feet deep. There are three small mounds within the enclosure.

No. 1 was 30 feet long by 20 feet wide, and 4 feet high. The top layer, 1 foot thick, was of loose sand; the remainder was of hard, yellowish clay. In this were several large, flat sandstone fragments, beneath which, at original surface, was a much-decayed human skeleton, with a few stone chips, unios, and potsherds.

No. 2 was a cairn of sandstones covering human bones, charcoal, and ashes. It was 18 feet in diameter and 3 feet high.

No. 3 was a cairn covered with earth and heaped over a mass of charred bones, charcoal, ashes, and potsherds. It was 15 feet in diameter and 3 feet high.

South of this group, just across an impassable slough, on a terrace at the foot of a bluff, is an oblong enclosure. Along the margin of the slough runs a wall 300 feet long; from its ends two walls run south, nearly at right angles to it; the western one is 160 feet long, the eastern is 175 feet long. The height of the walls varies from 1 to 3 feet, and the width from 10 to 15 feet. Outside of each end wall is a washout.——A walled vault in the side of the eastern bluff near here is described, and referred to some white or half-breed trapper.

Thomas <sup>174</sup> mentions mounds located on the Hays farm, just above the junction of the Upper Iowa and Mississippi Rivers, two miles south-east of *New Albin*. Besides small mounds, there

ALLAMAKEE COUNTY—*Continued.*

is here an excellent circular enclosure <sup>221</sup>. The circle consists of three parallel ditches and two intermediate earthen walls. The inside ditch was originally probably 5 or 6 feet deep and 12 feet wide; the inner wall is the same width; the middle ditch is 4 feet deep and about the same width as the wall. The circular wall is broken on the side where it strikes the south margin of the bluff overlooking the slough. The circumference of the circle exclusive of the break is 996 feet; the break extends along the bluff 225 feet. At the south-east an embankment 10 or 12 feet wide and from 3 to 5 feet high runs down the crest of a narrow spur about 150 feet, gradually tapering to a point.——Three “furnaces” of stone are here. One was in a small mound with-



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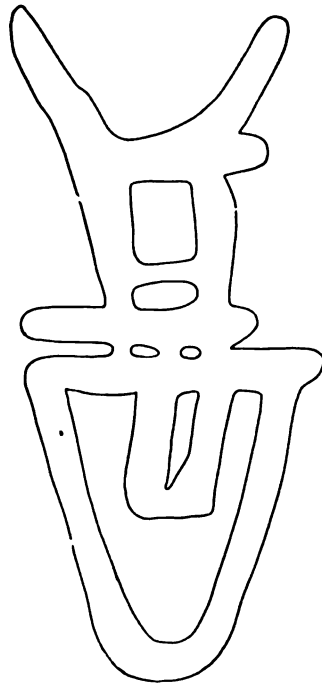
FIG. 1.

in the enclosure; the mound was 24 feet in diameter. In it were two walls of stone, flat sandstones roughly laid up and gradually drawn in near the top until one layer would cover the opening left in the top near that end. The walls were about 13 feet long, 3 feet high, and 3 feet apart. The stones show signs of fire.

ALLAMAKEE COUNTY—*Continued.*

The other two furnaces were not covered by mounds, and were outside the circle about eighty or ninety paces from its north-western part.

The caves below New Albin in the bluffs of the Mississippi River are mentioned by Thomas <sup>174</sup>, Mallery <sup>91</sup>, and carefully described by Lewis <sup>86</sup>. *No. 1* is above *Kain's Station*, in N.-E.  $\frac{1}{4}$  Sec. 26, Twp. 100, R. 4 W. A rock ledge extends for 150 yards



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FIG. 2.

along a slough, rising to a height of 25 feet above the water. The cave has been used as a home, and fragments of burnt bones, potsherds, etc., are dug up in the floor. Here are pictographs. One represents a human head with horns or feathers (Fig. 1). In fissures and shelters in the same ledge are other representations of hands, feet, men, bird-claws, etc. *No. 2*, in the N.-E.  $\frac{1}{4}$  Sec. 18, Twp. 99, R. 3 W., is a small cave in a ledge of rock 200 feet above

ALLAMAKEE COUNTY—*Continued.*

the river. The designs were incised and then painted; several human heads, snakes, animals, canoes, and the like occur; also one bird (?) measuring 6 x 15 inches (Fig. 2). No. 3 is in a ledge 100 feet above the river, three or four miles below *Lansing*, in N.-E.  $\frac{1}{4}$  Sec. 3, Twp. 98, R. 3 W. Here are simply two fissures, which formerly bore a large number of designs—men, animals, snakes, birds, human feet, tracks of birds and animals, human faces, canoes, etc.—but few are left. One design appears to represent some sort of bird; it measures 14 x 19 inches (Fig. 3).



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FIG. 3.

This last locality is apparently the one referred to by Mallery <sup>71</sup> as fifteen miles south from New Albia.

Alexander <sup>2</sup> further speaks indefinitely of other works and relics. According to him, circular (and one rectangular) enclos-

ALLAMAKEE COUNTY—*Continued.*

ures occur, located usually at intervals of two miles, on the second bottoms. They range from 75 to 100 feet in diameter, and the embankments vary from 25 to 30 feet in width, and are 2 to 3 feet high. He mentions as found in them large stone mortars, pestles, stone axes, celts, arrow-heads, etc. Stone mortars may attain to 14 inches diameter; pestles are of several styles; celts range from 2¼ inches length to the size of a blacksmith's sledge.

Uncertain location, due to 'Thomas' misuse of name, Little Iowa, elsewhere; means, perhaps, the Upper Iowa <sup>173</sup>. Near the Mississippi River, a short distance below where the Little Iowa joins it, a group of mounds on the crest of a ridge one-fourth mile from the Mississippi and parallel to it; thirty or more mounds; circular, 20 to 40 feet in diameter. All are burial mounds. Those on the higher sandy ground, although of about the same size and with cores of clay similar to those on the firm clayey portion of the ridge, have an upper layer of 2 feet or more added to them. Under the clay core are decaying bones, potsherds, rude stone implements; generally two or more skeletons in a mound, horizontal, side by side, on original surface. On the terrace below were remnants of a row of comparatively *large* burial mounds, largely destroyed by railroad. They ranged from 6 to 15 feet high, and were chiefly of sandy loam like the neighboring soil; each had a central core of hard clay and ashes. Usually one skeleton; relics—chiefly stone axes, arrow- and spear-points, and a few copper celts.——In one mound, 32 feet diameter and 8 feet high, less injured than the rest, was a circular vault of flat, unworked stones, dry-laid, lessening above, and covered by one stone. One skeleton, and a squat and small, globular, earthen vase. This locality is described also by Thomas in his final report. <sup>221</sup>

## BOONE COUNTY.

Fulton <sup>59</sup> mentions mound at *Moingona*.

## CERRO GORDO COUNTY.

On the south bank of Lime Creek, at *Hackberry*, a small mound on a bluff 70 feet above the stream, has been examined by Webster. <sup>187</sup> The position is a fine outlook point. The mound, partly destroyed by natural agencies, appears to have been origi-

CERRO GORDO COUNTY—*Continued.*

nally  $1\frac{1}{2}$  to 2 feet high, is circular, and measures about 15 feet in diameter. At a depth slightly below the original surface of the surrounding land was a horizontal layer of broken pottery, the fragments having their concave side upward; numerous finished and unfinished arrow-points here. In the south-east part of the mound, a few inches above the pottery layer, were found several plates from the plastron of a turtle; these may have been interred after the mound was built.

## CHEROKEE COUNTY.

*Township 93, R. 39* (Spring Township). On the banks of Little Sioux River, at 3 feet below surface, Cutts<sup>34</sup> found fragments of ornamented pottery. The river here is terraced at ten to twelve feet in height; the upper six to eight feet is alluvial soil—loëss wash; below that is a grayish clay. The pottery fragments are numerous, ornamented with cross and parallel lines and indentations; the ware is from  $\frac{1}{8}$  to  $\frac{1}{2}$  inch thick.——A circle of stones about the size of the fist was found; within it were charcoals; above this were potsherds; then the bones of buffalo, elk, and beaver.

## CHICKASAW COUNTY.

Near *Old Chickasaw*, on the west side of the Little Cedar River, a group of ten mounds has been carefully described by Webster.<sup>186</sup> Their location, about one and one-half miles below the town, is at the border of the first terrace, 20 to 40 feet above the flood-plain at its base. A spring is situated at a distance of about 260 yards to the south-east. The mounds are from 2 to 50 feet apart, are circular, round-topped, and measure from 22 to 51 feet in diameter, and from  $1\frac{3}{4}$  to 5 feet in height. The main line of mounds runs north, a few degrees east. The others run parallel to the main line. The mounds of particular interest were:

*No. 1.* Mound 22 feet in diameter and about 1 foot in height. A few inches above the original surface was a thick bed of charcoal and a large, thoroughly-burned oaken log 8 feet long and 12 inches thick; there were no ashes to speak of.

*No. 2.* This mound was graded down years ago; its structure was as that of No. 4, but the mound was smaller; at the original surface two sitting skeletons were found; the bones were

CHICKASAW COUNTY—*Continued.*

well preserved. No relics were found in these mounds nor in the surrounding fields.

*No. 3.* In this three well-preserved skeletons were found, in sitting posture, at the level of the original ground surface; (*a*) one skeleton faced the east; the second (*b*), in front of (*a*), faced it; the third, a few inches north of (*a*), faced the east. The skulls of all three of these skeletons were markedly Neanderthal-



FIG. 4.

oid in type. In one specimen the lower forehead back of the eye orbits is very narrow, but rapidly expands backward; the frontal arch rises only 4.7 mm. before sloping abruptly backward, leaving a concavity back of and over the eyes. The largest cranium was  $6\frac{1}{4}$  inches long by 5 inches wide. One skull appears to be that of a woman; another appears to have belonged to an aged person.——The structure of this mound is reported. The upper  $3\frac{1}{2}$  feet was of yellow clay soil unlike that in the immediate neighborhood; under this came  $1\frac{1}{2}$  feet of earth and ashes, very hard, with scattered bits of charcoal; then, at the original level, the skeletons.

*No. 4.* Two sitting skeletons were found at the original ground level. The crania were crushed, but some of the long bones were preserved. These indicate great muscular development and lofty stature.——Structure: the upper  $1\frac{3}{4}$  feet were

CHICKASAW COUNTY—*Continued.*

of yellow earth; then  $3\frac{1}{4}$  feet of very hard earth and ashes, below which were the skeletons; scattered pieces of oak charcoal were found and patches of ashes; under the latter were thin, deeply-stained layers of earth and ashes.

*No. 9.* Four sitting skeletons at about  $1\frac{1}{2}$  feet above the original surface. The lower jaw of one was large, strong, with squared angles; the teeth were well preserved, but worn down; one molar had a decayed cavity. Another lower jaw measured  $12\frac{1}{2}$  cm. from outer angle to outer angle, but had been fractured during life; the angles were low and much straightened; the teeth, except incisors and canines, were gone and the cavities absorbed. One skull appears to have been subjected to action of fire before it was buried. The skeletons appear to have belonged to two aged, one middle-aged, and one younger individual.—— In structure this mound showed, first,  $1\frac{1}{4}$  feet soft, yellow earth; then  $1\frac{3}{4}$  feet mixed earth and ashes of great hardness, with a small amount of scattered charcoal. The skeletons were at centre, upon a hillock of ashes and earth  $1\frac{1}{2}$  feet high.

*No. 10* yielded three well-preserved skeletons. The bodies had been placed sitting with feet drawn under. One lower jaw, in fine preservation, was particularly massive and broad, with large, sound but much worn teeth.—— The mound was 45 feet in diameter and 3 feet high. The material was as in the others, but not packed hard. The skeletons were upon a little hillock about 1 foot in height.

*Bradford.* Webster <sup>188</sup> describes Winnebago graves on the brow of the hills overlooking the Little Iowa River. More than twelve individuals, wrapped in blankets and with provisions and possessions, were buried here. They were covered over by stakes driven obliquely into the ground on each side and meeting above; clods of earth covered these.—— On the west of the stream are many graves; these were enclosed by a tight crib. (cf. Charles City, Floyd County, Iowa.)

## CLAYTON COUNTY.

Davis and McDonald <sup>162</sup> describe "lookout" mounds, yielding no relics, at localities as follows: On high bluff overlooking the Mississippi River *opposite Prairie du Chien*, the land belonging to the Girard Land Company; on bluff one-fourth mile south of

CLAYTON COUNTY—*Continued.*

the above. There are at the latter place two mounds, circular, 25 feet in diameter and 4 feet high; a third lies seventy feet back from these.

Lewis <sup>83</sup> gives description of a group of effigy mounds near *North McGregor*, 500 feet above the river, on a dividing ridge situated in S.-W.  $\frac{1}{4}$  Sec. 3, Twp. 95, R. 3 W. The surrounding

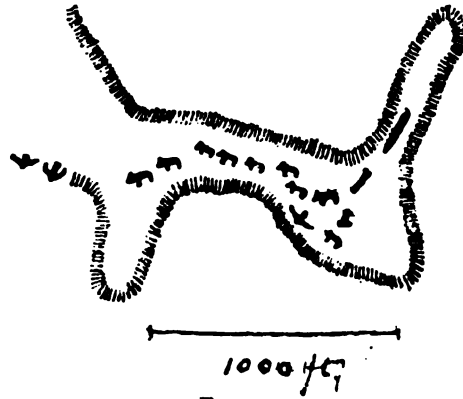


FIG. 5.

country is broken and rugged. The Yellow River lies to the north-west and Bloody Run to the south-west. The group extends a distance of about 2,000 feet, and includes ten animals and three birds, with two long embankments. The first embankment is 190 feet long, 18 feet wide,  $1\frac{1}{2}$  feet high; the second is 138 feet long, 18 feet wide, and  $1\frac{1}{2}$  feet high.

The effigies vary from 79 to 109 feet in length and are from 2 to 3 feet high; no two effigies are just alike, the variation being most marked in the head; all are tailless; though the construction is good the form and design are bad; the birds are all different and are symmetrical, but the wings are unnaturally long.——One mile south and east is one bird effigy.

Thomas <sup>174</sup> lists three groups of mounds above *McGregor*. These may be the same as above described.

Near *Sny Magill* Lewis <sup>83</sup> mentions a group of ninety-two mounds. These are mostly round mounds and embankments, but there are also two animals and two birds. A number of skeletons were found in one large tumulus in this group. The same group is listed by Thomas. <sup>174</sup>

In an article by Clement L. Webster <sup>190</sup> a mound situated four and one-half miles west of *Guttenberg* is described. The mound is on the bank of the ravine of Miner's Creek, some 60 feet above the stream; it was 10 feet long by 7 feet wide, and composed of soft soil; evidently modern, it yielded a well-preserved skeleton, with stone arrow-heads, a pestle, a catlinite pipe, etc.

CLAYTON COUNTY—*Continued.*

The same author mentions a circular, round-topped mound, 24 feet in diameter and  $3\frac{1}{2}$  feet high, situated five or six miles south-east of *Garnaville*, on the brow of a bluff 260 feet above Buck Creek, near its junction with the Mississippi. At  $2\frac{1}{2}$  feet below the original surface, at the center of the mound, was a well-preserved skeleton, extended, with head to the north. The front part of the skull was crushed. No relics were found. The soil was soft and the mounds appeared to be modern. Lewis<sup>83</sup> says mounds and embankments, singly or in groups, are found at intervals between Guttenberg and Yellow River.

Webster,<sup>190</sup> quoting Knapp, mentions many circular and long mounds in and near *Guttenberg*. He considers most or all of them as recent. Some, he says, are 124 feet long and contain bones. One, opened by Knapp, was circular, 16 feet in diameter, 3 to 4 feet high; it contained, at centre and 2 feet below the original surface, a skeleton; at each side of the head was a large silver ornament, circular, and 2 inches in diameter; flint arrow-points were also found; the mound was composed of soft, moist soil.

The same author describes the making of arrow-heads by a band of Pottawatomies on *Twelve-Mile Island*, in the Mississippi River, near Guttenberg. A notch six inches deep cut in a tree-trunk and the leg bone of a deer were the elements in the apparatus, with which the flints were chipped by pressure.

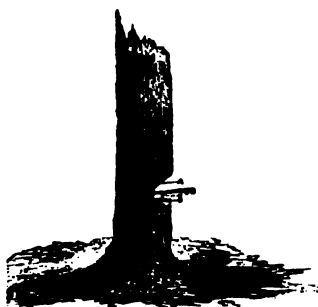


FIG. 6.

Thomas<sup>174, 221</sup> mentions an effigy mound on a bluff overlooking the Turkey River, near *Elkport*, about ten miles west of the Mississippi River. Perhaps an otter; length, 150 feet; greatest height, 5 feet.

Webster<sup>190</sup> describes a stone grave near *Buena Vista*, three or four miles west of the Mississippi River, on the summit of a high hill. A rude box of large stone slabs contained a skeleton extended at length, head to the north, with arrow-points, axes, and other stone implements.

## CLINTON COUNTY.

At *Lyons* was a square mound, with flat and level top measuring 40 feet across, situated upon a bluff at some 200 feet above the river. Farnsworth<sup>49</sup> reports that its height was perhaps 8 feet, and that the structure was removed to fill in low ground in the town. In excavating, heaps of bones were found both on the east and the west sides of the mound; the skulls were distorted ("like specimens from Albany, Illinois"), but could not be preserved; some of the long bones were broken and some were gnawed before burial. Some of the skeletons of the eastern heap, especially those near the middle of the mound, appeared to have been buried extended; flat pieces of stone were laid over some of the bones; fires appear to have been kindled above some of the bone-heaps.——An oval slate tablet 5 inches long and 3 inches wide, with two holes, was found here.——Near the centre of the mound was a skeleton, well preserved, seated; about the neck were copper beads, and on the breast a thin copper sheet, 4 inches square, badly eroded; to the left were a pipe of soft sandstone and a small, polished, stone axe. The author considers this an intrusive burial.

Three miles east of *Wheatland*, on the bluffs of the Wapsipinicon, is a group of nine low, conical mounds, averaging about 15 feet in diameter and 2 feet in height. Four were opened; they were composed of a mixture of black soil and clay; no bones, relics, nor traces of fire were found.<sup>38</sup>

Cyrus Thomas<sup>174</sup> cites Colonel Norris for mounds at *Buena Vista*.

## CRAWFORD COUNTY.

A group of eight mounds in a semi-circle below *Denison* are reported by Fulton;<sup>59</sup> also a group of mounds at the mouth of *Paradise Creek*.

## DELAWARE COUNTY.

Moulton's<sup>97</sup> description is very imperfect; no locality is given, and little information regarding the size of most of the mounds. So far as we can make out from his description, three series of earthworks enclose a square open on the west and comprising about ten acres; the northern row runs nearly east and west, slightly curving with the high ground on which it is located; the

DELAWARE COUNTY—*Continued.*

eastern series consists of two earthworks, respectively 40 and 50 yards long, separated by an interval of 10 yards, and running S. 20° W.; these embankments begin 36 yards from the end of the line of mounds; from its southern end,—W. 18 yards and S. 54 yards,—begins another line of mounds, six in number, with the same course; from the southernmost of these is another series of six extending to the west; starting at the north-east corner of the series is a line of eleven mounds running in a straight line north-east. These are round and symmetrical, 4 feet high and 30 feet in diameter.

## DUBUQUE COUNTY.

Near *Peru*, according to Thomas, <sup>173, 221</sup> is a group of mounds upon a dry sandy bench or terrace, 20 feet above a bayou making out from the Mississippi River. The mounds are mostly small and circular; at the north end are four mounds from 40 to 110 feet long and from 1½ to 4 feet high; here also is an excavation some 30 feet in diameter and 6 feet deep; scattered circular earth-rings from 12 to 30 feet in diameter and 1 foot to 2 feet high occur.—— The inner part of these mounds is of hard, compact earth or clay. They yield detached parts of human skeletons. Thus in one may be a skull, in another a leg, arm, or some other part; four or five adjacent mounds might furnish a whole set of bones. Some of the bones are charred and much decayed.

At *Eagle Point*, three miles above Dubuque, is a group of mounds <sup>173, 221</sup> on a bluff fifty feet above high-water mark. There are about seventy mounds in the group, all but two of which are small and conical; two are oblong. About eleven of the small mounds were opened, and nothing but charcoal, stone chips, and potsherds were found.—— In one long mound, just west of the group, were two much decayed skeletons; near the breast of one was a gorget of blue stone and five rude stone scrapers; with the other were found thirty-one fresh-water pearls.—— An oblong and a circular mound near the extreme point of the bluff were opened; they presented a central core of clay and ashes, very hard but crumbling when broken out, and traversed by flattened horizontal cavities lined with a felt-like substance.

Woodman <sup>203</sup> speaks of mounds in the north part of *Dubuque*, adjacent to Lake Peosta. These may be the same as those just

DUBUQUE COUNTY—*Continued.*

described. He says that the group is located fifty feet above the Lake, and that it contains about seventy mounds, regularly arranged in straight or slightly-curving parallel lines. All but the three largest are circular; the smaller ones measure about 20 feet in diameter and 2 to 2½ feet in height; they average about 15 paces apart from centre to centre; they are composed of ordinary soil.——A few rods north and east from the group fragments of pottery and several flint arrow-heads were found.——The same observer remarks that many mounds have been destroyed in building the city of Dubuque.——Another author mentions a cairn near the Lake Peosta group.

McGee <sup>94</sup> figures a group of mounds located in the S.-E. ¼ N.-E. ¼ Sec. 4, Twp. 88 N., R. 1 W. These are about three miles north-east of *Farley*. There are three animal mounds and

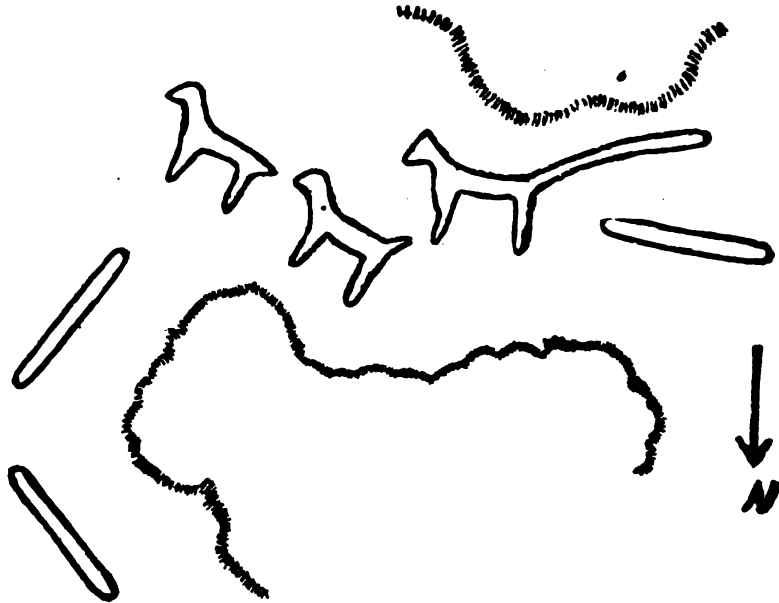


FIG. 7.

three long mounds in the group (Fig. 7).——A mile west of this group, on the same elevation, is a large animal effigy.——Two miles east, on the end of the same ridge, are two embankments, each about 40 yards long.——A great system of mounds exists

DUBUQUE COUNTY—*Continued.*

on the ridge separating the Mississippi and Turkey Rivers. The ridge is never more than a mile in width and is usually narrow; it rises two hundred to three hundred feet above the river level. Mounds, extending in a line toward the north-west for about six miles, occur upon it; they number more than forty, and comprise simple conical mounds, embankments, and effigies. This group was the one upon which McGee made his special metrological study.

Hermann <sup>211</sup> reports a fine double-grooved stone axe, 10 or 12 inches long, from a mound near Catfish Creek, and a nearly transparent quartz spear-head 7 to 8 inches long.

## EMMETT COUNTY.

Aldrich <sup>1</sup> mentions a line of thirteen large mounds, extending north and south, upon a high river terrace; they are from 1½ to 6 feet in height; no exact location is assigned.

## FLOYD COUNTY.

Webster has pursued studies here with much care, and reports the results in several important papers.

Near *Charles City* <sup>187</sup> is a large and very interesting group of thirty-one mounds. They lie, with one exception, near the centre of Sec. 26, Twp. 96, R. 16 W., about two miles north-west of Charles City (the one exception is near the centre of S.-W. ¼ Sec. 23). Twenty-eight of them are in a nearly straight line running 20° W. of N., on the summit of a low, broad ridge. The topography is shown by the diagram. (Fig. 8.)

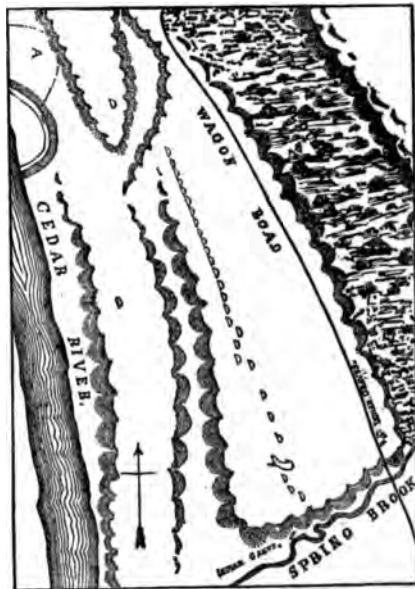


FIG. 8.

- No. 1. The southernmost; largely natural elevation; no finds; 63 feet long, 48 feet wide, 3 feet high.
2. Seventy-one feet west; circular, 21 feet in diameter and 1½ feet high.
3. Fifteen feet north-west; circular, 20 feet in diameter and 2 feet high.

FLOYD COUNTY—*Continued.*

\*4. Ten feet from last; large, curved mound, 163 feet long on outer curve; 20 to 25 feet wide,  $2\frac{1}{2}$  to 3 feet high; tapers and decreases in height toward the north-west, where it is only 8 feet wide and  $1\frac{1}{2}$  feet high; near this end is an extension of the mound—a spur 27 feet long, rapidly diminishing in height and width to 1 foot and 10 feet; apparently a natural mound, modified; no remains.

5. Three hundred feet from No. 4; circular, 21 feet in diameter,  $1\frac{1}{2}$  feet high.

6. Two hundred feet distant; circular, 21 feet in diameter, over  $1\frac{1}{2}$  feet high.

(There is an illy-defined mound between Nos. 5 and 6, not shown on the diagram.)

7. One hundred or more feet from No. 6, and like it.

8. Fifty feet distant; circular, 45 feet in diameter and 3 feet high.

\*9. Ten feet distant; 30 feet in diameter,  $2\frac{1}{2}$  feet high.

\*10. Twelve feet from No. 9; circular, 36 feet in diameter and 3 feet high; no finds.

\*11. Four feet distant; circular, 45 feet diameter,  $2\frac{1}{4}$  feet high.

\*12. Twelve feet distant; like No. 11, but slightly smaller.

13. Fifteen feet from No. 12; circular, 45 feet diameter and 2 feet high.

\*14. Sixteen feet from No. 13; circular, 51 feet in diameter,  $1\frac{1}{2}$  feet high.

\*15. Ten feet distant; circular, 30 feet in diameter,  $1\frac{3}{4}$  feet high.

\*16. Sixteen feet distant; of same character.

17. Three feet distant; circular, 25 feet in diameter,  $1\frac{1}{2}$  feet high.

\*18. Twenty feet distant; circular, 42 feet in diameter,  $2\frac{1}{2}$  feet high; homogeneous structure.

\*19. Twenty feet from No. 18; same measurements.

\*20. Twenty-one feet distant; like last.

\*21. Twenty-five feet distant; circular, 30 feet in diameter, 2 feet high.

\*22. Thirty feet distant; of same size.

FLOYD COUNTY—*Continued.*

\*23. Twenty-five feet distant; circular, flattened, 30 feet in diameter, 1 foot high.

\*24. Twenty-five feet distant; circular, 45 feet in diameter, 1½ feet high.

\*25. Twenty feet distant; circular, 45 feet in diameter, 3 feet high; a few scattered fragments of charcoal and burnt clay; the whole is packed hard.

\*26. Fifty-three feet distant; 33 feet in diameter, 3 feet high; a few small bits of oak charcoal.

27. Five feet distant; same form but smaller.

28. Forty feet distant; circular, 24 feet diameter, 1 foot high.

Several mounds in this group yielded interesting results, thus:

*No. 9.* From 20 inches and downward pottery fragments were found. On the natural surface of the ground was a bundle of human arm and leg-bones, lying east and west; on the east end of these was a crushed and somewhat separated cranium, some parts very thick, with large and strong teeth; these parts pertained to a young adult.——Two feet north-east of this was a similar bundle, directed a few degrees south of east; on the east end of this bundle lay part of a crushed skull; these somewhat charred.——A few feet south-east a similar bundle, directed 13° south of east; no skull.——A few feet north-west of the first bundle, another, lying east and west, without skull.——Evidence of fire, bits of charcoal, burned clay, and heated limestones scattered through mound.——A former exploration had removed a skull and some bone-bundles.——All the bones in the mound show some evidence of calcination, but all but second bundle apparently burned *elsewhere*.

*No. 11.* At 10 inches depth, and slightly east of the centre, a piece of broken pottery and a few small fragments of charcoal. No signs of fire built here.

*No. 12.* Numerous pieces of hard-burned clay from outside scattered through it. At 10 inches part of a calcined femur. No signs of fire.

*No. 14.* In centre, at 10 inches depth, an imperfect dog's (?) skull, facing the south-west. Near this skull and 7 inches below it were five quite closely-associated bundles of leg and arm-bones; in three cases crushed skulls were on the west end of bundles,

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\* Opened by Webster.

FLOYD COUNTY—*Continued.*

and one skull lay between two of them; under the west end of the north bundle was half of a lower jaw, retaining teeth; the skull between the bundles was on its right side, with mouth open,

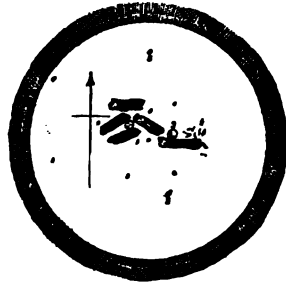


FIG. 9.

Diagram of Mound No. 14.

facing the north-west; the teeth were (some of them) scattered through the soil; all the bundles lay directed in an east, north-east, or south-east direction.——Seven inches below the dog's skull were pieces of ribs and other small bones promiscuously thrown in.——All the skulls were rather thick, with large and strong jaws and teeth. Some of the bones were of aged persons, but most were of young adults.——Scattered

through the mound were numerous pieces of burned clay and charcoal from outside.——Six inches from surface two large slabs of water-worn Devonian limestone.——The human remains had all been subjected to heat before burial here. (Fig. 9.)

*No. 16.* Human leg and arm-bones apparently thrown in promiscuously, at 17 inches depth. No fire here.

*No. 19.* An adult skeleton, at length, with head  $11^{\circ}$  south of east, found at depth of original surface. The body had been placed on its back, head on its left side, mouth open about an inch, left shoulder drawn up, and chin resting on clavicle; the arms at sides. Cranium large, well formed; jaws strong; teeth large, strong, and much worn; bones poorly preserved.——No trace of fire; no relics.——Earth around and for  $1\frac{1}{2}$  feet above body hard-tamped.

*No. 20.* In centre, at 26 inches in depth, three bundles of long bones, five crushed skulls, two decayed pelvic bones.——In the midst of these bones a very rude but nearly perfect pottery vessel, upright. The bones represent all ages, but were poorly preserved and more or less calcined—some before and some after being placed here.——Charcoal, burned clay, and potsherds with the remains.——Soil above and around bones packed hard.

*No. 21.* Within was found a circular, oval mound of red, burned clay, of about 10 feet diameter and 1 foot in height. Its

FLOYD COUNTY—*Continued.*

surface was at a depth of about 1 foot. Under this, and nearly central, were three bundles of bones, two directed 11° east of south, the third one north-west and south-east; on the north end of the two former reposed crushed skulls; on the south-east end of the third was also a crushed skull.——Many other human bones were associated with the bundles. All had been more or less burned.——No charcoal, ashes, etc. (Fig. 10.)



FIG. 10.

*No. 22.* At 2 feet depth, near the centre, a bundle of bones and part of a skull, all much decayed. The bundle lay north-east and south-west.——Pieces of oak charcoal and burnt clay from outside were scattered through the mound.——No fire here.——Soil around and above had been beaten hard.

*No. 24.* At 3 feet south of the centre a bundle of bones lying due east and west; two skulls lay, one on each end of this bundle; the one on the east was large, of moderate thickness, with very low forehead abruptly sloping backward; teeth large, strong, much worn.

[N. B.—A later study of the locality showed two curious mounds in the neighborhood of the mound No. 4 (see diagram).

Nearly to the east, 4 or 5 feet distant, was an elliptical mound, 30 feet long, 24 feet wide, 2 feet high. Still further east, 24 feet from No. 4, is a long mound 81 feet in length, 15 feet at base, and 2 feet high. (Fig. 11.)——Several small, circular mounds, from 8 to 10 feet in diameter, run in a north by north-west line from the elliptical mound.]

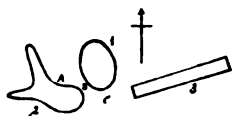


FIG. 11.

Three isolated mounds occur in the neighborhood of this group:

(a) One-third of a mile north-west of the line of mounds; it is circular, 20 feet in diameter, and only 6 inches (originally 1½ feet) high. It is situated upon a higher and narrower ridge than the group, and at forty rods distance from an abandoned part of the channel of the Cedar River. At 6 inches below the original surface was much broken pottery, charcoal, two sinkers,

FLOYD COUNTY—*Continued.*

an arrow-head, and flint chips; all of these were burned after being placed here; 1 foot below the pottery were parts of a human skeleton. An earlier explorer found pottery and a good net-sinker.——The pottery found showed a combination of net and basket and separate cord markings; the vessels were in some cases smoothed, all were of moderate thickness, of a reddish yellow color, and made of clay, fine gravel, and powdered granite. Parts of six vessels were found; one of the largest and best reconstructed had a diameter at mouth of  $20\frac{1}{2}$  cm.; a maximum diameter of 31 cm.; a height of 16 cm. The neck was sharply constricted. Several of the six vessels had a similar form.——About six feet north-east of the mound is a depression 10 feet in diameter and  $1\frac{1}{2}$  feet deep, whence the material may have been taken.——Along the abandoned river channel, forty rods north-west of the mound, broken pottery, some unlike that from the mound, is found on the lower and level space; also arrow-points, lance-points, drills, flint chips, hammers, etc.

(b) One-half mile north-east of last, on the end of the brow of the ridge near the Cedar River. The mound is circular, with diameter of 20 feet and height of 2 feet. It was long since opened, and yielded pottery fragments. Other relics have been found near by—very rude arrow-heads; a spear-head; a fine knife of milky quartz,  $7\frac{3}{4}$  cm. long, 3 cm. wide, and tapering toward each end; a beautifully symmetrical ovate plummet, with a longitudinal groove about it—length,  $5\frac{1}{4}$  cm., diameter,  $5\frac{1}{4}$  cm.

(c) Opposite No. 14, on the second ridge, west of the line of mounds. It measured from north to south 42 feet; from west to east 30 feet; 1 foot high. About 3 feet from the base of the north-east part of the mound is a saucer-shaped depression, about 22 feet in diameter and 1 foot deep; a long, shallower depression exists along the whole east side; these spots apparently supplied the material for the mound. At 1 foot below the original surface, near the north-eastern part of the mound, were several leg and arm-bones and part of a calcined skull carelessly placed. Five feet south of here were remains of a second body, with the leg-bones and arm-bones more completely calcined; in general the long bones lay north and south; they had apparently been calcined elsewhere; a few pieces of charcoal, potsherds, and flint chips were found near the surface.

FLOYD COUNTY—*Continued.*

One-third of a mile south of the line of mounds, at a lower level, were several other round mounds which were not explored.

Eight miles north-east from *Charles City*, on the S.-W.  $\frac{1}{4}$  N.-W.  $\frac{1}{4}$  Sec. 36, Twp. 96,

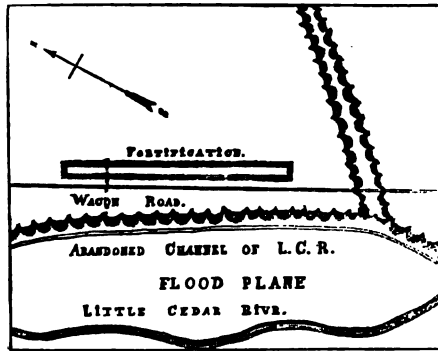


FIG. 12.

R. 15, an ancient earthwork lies on the east side of the Little Cedar River. The country is broken and irregular; the earthwork is about one hundred and fifty feet from an abandoned channel of the river, and about the same distance from a ravine on the south-east, tributary to the Little Cedar; the beds

of these channels are 18 to 20 feet below the fortification. The earthwork is 124 feet long, 16 feet wide at base,  $2\frac{3}{4}$  feet high; it is composed of ordinary soil; it trends  $17^{\circ}$  W. of N. Arrow-heads are not uncommon in the neighborhood. (Fig. 12.)

In the "big woods" on the west side of the Little Cedar, seven miles below the above locality, are three mounds of drift boulders and soil. They are  $2\frac{1}{2}$  feet high, 2 feet wide, and from 4 to 7 feet long.

Two miles north-west of *Charles City* is a group of four Indian graves on high, dry ground, north from a small creek. They are close together; three extend north-east and south-west, while the other is north and south; three are graves of adults and are 7 feet long, while the other is that of a child and is  $3\frac{1}{2}$  feet long. They are perhaps Winnebago graves. One-fourth mile west-south-west is a grave where a Winnebago was buried in 1849–1850. Wrapped in his blanket he was laid out at length, extending north-east and south-west, on a level space back from a creek. Slabs of green wood 3 feet long were placed over his body in an inverted V-shape, meeting at the top. The ends of the enclosure were covered over with other slabs. At the head was a post of green wood, 6 inches in diameter, driven into the ground; this post was peeled and bore characters. A tight log crib was built about this enclosure; it was of green logs laid up in log-cabin

FLOYD COUNTY—*Continued.*

fashion, and measured 10 feet in length, 7 feet in width, and more than 3 feet in height; other logs were tightly fitted over the top.

—One mile below the last locality, on the south bank of the Cedar River, were several graves of Winnebago children. The bodies had been placed on the ground and enclosed on all sides by 12-inch logs; the space was then filled up with earth, which was heaped up 13 inches or so (Webster <sup>188</sup>).

Webster also describes <sup>185</sup> a group of three mounds on the west side of Cedar River, one-half mile east of *Floyd*. They are situated on a high, level space, 50 feet above and 220 yards back from the stream, midway between two points; they form a slightly curved line. They are low, circular, and separated from each other by intervals of about 20 feet. The largest and easternmost mound is about 30 feet in diameter, and was once 2 feet high; the smallest is perhaps natural. In the largest were five well-preserved skeletons. The structure of the mound shows that the surface had first been excavated into a basin shape to a depth of  $3\frac{3}{4}$  feet; the basin was then macadamized with gravel and fragments of limestone; on the center of this floor the five skeletons had been placed in a sitting position, facing north, and with the feet drawn under the body; a thin layer of earth was piled above them, then 9 inches of earth and ashes in which were a few bits of fine-grained charcoal; the remaining four feet was nearly all red from heat; the whole material was rammed or pounded hard;



FIG. 12.

the soil about the bodies was deeply stained from decomposition. The westernmost skeleton was that of a woman of middle age; six inches east of it was an infant's skeleton; to the north, and close by the babe, was the skeleton of a large, middle-aged man; skeletons of two young adults lay east and south of the babe. The woman was apparently of low grade, and well muscled; the

FLOYD COUNTY—*Continued.*

skull was markedly neanderthaloid (Fig. 12); the forehead was low; the inner portion of the brow-ridges was prominent; the skull was small; from the lower part of the nasal bones to the upper margin of the orbits was but 4 cm.; the distance from orbit to orbit, midway between their upper margins and the lower part of the nasal bones was  $2\frac{3}{4}$  cm. Most of the skulls were crushed; one jaw had teeth well preserved. The skull of the babe was very thick; the teeth were small. The man was nearly six feet high; the crowns of his teeth were much worn down.—— This mound appears to be very ancient; the limestone fragments in the floor are much decomposed.

A small mound near *Floyd* is reported to have yielded a skeleton.<sup>184</sup>

A peculiar mound is described by Webster,<sup>187</sup> in a low, level spot at about the centre of the S.-E.  $\frac{1}{4}$  Sec. 5, Twp. 95, R. 17 N., one-half mile west from *Flood Creek*. It is 16 feet in diameter and 1 foot high; circular at base, it is flat-topped, except a rounded ridge 8 or 10 inches high and 1 foot wide at the outer edge of the surface area. A trench 10 inches deep and 1 foot wide is around the base. The mound is overgrown with trees. The structure of the mound was found to be—

- (a) Decomposed vegetation and earth.
- (b) Charcoal layer.
- (c) Bed of ashes.
- (d) Soil.

This order was repeated; the natural surface then reached showed no particular evidence of strong heat; the charcoal, in large pieces and well preserved, appears to be of poplar wood; no bones or relics were found (Fig. 13).



FIG. 13.

The same author<sup>188</sup> describes a grave on low, dry ground in *Carman's Woods*, near the meeting of the Beaver Dam Brook and Shellrock River, one-half mile north of Rockford. The grave was 7 feet long,  $2\frac{1}{2}$  feet wide,  $1\frac{1}{4}$  feet high, and 3 feet deep; it

FLOYD COUNTY—*Continued.*

is excavated through soil down to the limestone; through the centre of the grave, running lengthwise from bottom to top, is a

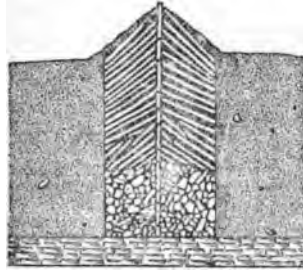


FIG. 14.

line of limestone slabs set edgewise; these slabs are from 2 to 3 inches thick; the lowest foot of depth in the graves was filled with fragments of limestone; the rest was filled with slabs of limestone set obliquely with the higher edge against the central partition; the upper slabs were so heavy as to require a man's full strength in their removal. There were no remains and no relics (Fig. 14).

## HAMILTON COUNTY.

Aldrich <sup>1</sup> reports that in 1857 or 1858 an excavation at *Webster City* revealed, at two feet depth, a heap of human bones representing at least twenty-six persons; one skull was very large and thick; round beads of soft stone were also found.—— On a knoll in the south-east part of the town three skeletons were found at a depth of thirty inches.—— North of the town plat are five undisturbed mounds. They are located on a bluff some forty feet above the Boone River, and extend in a north-east and south-west line; the earth for the mounds was taken from north of the group.—— A mile from the town there has been found a polished stone tablet, about  $2\frac{1}{2}$  inches square and  $\frac{1}{4}$  inch thick; drilled with two holes on opposite sides.

A mound north-west of *Cairo Lake* is reported by Bonney.<sup>174</sup>

## HARDIN COUNTY.

A stone carving representing a human head is said to have come from a well excavation in this county;<sup>37</sup> the depth reported is thirty-nine feet.

## HENRY COUNTY.

It is said <sup>15</sup> that there are many mounds in the county; Mansfield <sup>162</sup> mentions some near *Mount Pleasant*.

Banta and Garretson <sup>15</sup> investigated a group of nine mounds at the *Snake Den*, three miles west of Salem. They report as follows:

- (a) Twenty feet in diameter, 8 feet high; no remains.

HENRY COUNTY—*Continued.*

(b) Some sixty feet from (a); 20 feet in diameter and very low; flat rocks were found above a large quantity of broken and, in some cases, burned bones.

(c) Some sixty feet from (b); 3 feet high; one skeleton, extended, between two flagstones; the head was toward the north; bones were badly decayed.

(d) Sixty feet from preceding; 20 feet in diameter; 3 feet high; three badly decayed skeletons, extended, with heads to the north.

(e) Sixty feet distant; 20 feet in diameter and 5 feet high; smooth, flat rocks were found, laid in an elongate hexagonal form; stones were set edgewise about the border; at five feet depth were two extended skeletons with heads north.

(f) At sixty feet distance; 30 feet in diameter; 5 feet high; not opened.

(g) At sixty feet distance; 20 feet in diameter; 5 feet high; a few bones were found.

(h) At sixty feet distance; 30 feet in diameter; 5 feet high; is *said* to have contained a rude stone vault, with badly decayed human skull, etc.; the bodies were buried, perhaps, in a sitting (?) position; a sandstone mortar and arrow-points were found here.

(i) At sixty feet distance; 5 feet high; no contents.

These mounds are in a right line; (a) is at the western end.

Van Allen <sup>182</sup> reports mounds situated in Sec. 34, Twp. 72, R. 7 W. Three in number, they are upon a hill 120 feet high, 1,000 feet long, and more than 300 feet wide. One was opened and yielded a quantity of bones, teeth, and charcoal; some of the sticks were but half burned; the bones were in a heap; some were charred, and more than one individual was represented by them; one pinkish-white arrow-head was found.——The measurements of these mounds are: (a), 50 x 41 feet; (b), 43 x 49 feet; (c), 40 x 40 feet; (b) was one hundred and seven feet from (a), and (c) was fifty feet from (b); the mounds ranged from 4½ to 3 feet in height.——Two mounds about 1 foot high lie south of (c).

## JACKSON COUNTY.

Gass, <sup>68</sup> without assigning locality, mentions in this county a very large, oval mound, 200 feet by 100 feet, (with circumference

JACKSON COUNTY—*Continued.*

of 700 feet), and 30 to 35 feet high; the sides have a very steep slope,  $70^{\circ}$ ; the top is flat, oval, measuring about 30 x 50 feet. The mound is situated on a bottom, near the bank of a creek, in a deep ravine. Excavation to a depth of 12 to 14 feet yielded pieces of hematite, some of which were burned, and two arrow-heads.——In another paper <sup>69</sup> the same author describes a mound of simple construction, with a diameter of 30 feet and a height of 4 feet. A few feet from the surface were found a number of irregularly-scattered stones and pieces of wood; at 5 feet a quantity of ashes, with burned bones, fragments of dark-colored pottery, two knives of copper, and a copper spear-head.——A human skeleton was found in a ditch excavation; near it were three ornaments of rolled copper, an arrow-head, and a bit of blanket.

With no other location than "Mr. Heisig's farm," the same author <sup>69</sup> describes a group of three mounds, arranged in an equilateral triangle, in an open, level field; they are about 15 feet in diameter and 3 feet high. Structure: (a) consists of hard mixed soil to a depth of 2 feet below the original surface; (b) consists of 3 feet of light earth, then 2 feet of mixed earth; (c) is like (a) in all respects.——A similar group in number, size, arrangement and construction is mentioned as near *Fairfield*.

One mile from *Spragueville*, on a hill near a creek is a mound composed of light earth, 15 to 20 feet in diameter and a few feet high; at 4 feet depth a human jaw-bone was found. <sup>69</sup> This mound is also mentioned in <sup>74</sup>.

In *Iowa Township*, four miles below the mouth of the Maquoketa and one-half mile from the Mississippi, on the Thomas Boothby farm, near "The Point," is a group of nine mounds; the land rises abruptly from the river; the mounds are in a single row; four of them have been examined by Mr. J. W. Boothby with the following result: <sup>89</sup>

(a) The furthest up the river; an elongated pyramid 5 feet high; the remains of seven skeletons were found; all were lying on their backs, three with heads east, four with heads west; under the skull of one of the latter was a thin copper crescent; above the skeletons were three or four large stones; on the floor of the mound, 4 feet north of the centre, was an earthen vessel

JACKSON COUNTY—*Continued.*

bottom-side up; this was destroyed in removing it, but measured about 25 inches in circumference and 4 inches in depth; under it was a *unio* perforated near the hinge; numerous pieces of scattered charcoal were found in the mound.

(b) *No. 4* in the series; is conical in form and about 60 feet in diameter and 5 feet high. It contained thirty-one skeletons, mostly with heads south and feet north, although there was no careful arrangement; a number of stones were above the bodies; on and below the cervical vertebrae of two of the skeletons were one hundred and sixty copper beads; in three of these beads the cord of woody fibre was still preserved; with one of the piles of beads were eight perforated bear's teeth; a flint spear-head,  $8\frac{3}{4}$  inches long, lay among the ribs of one skeleton; numbers of small, fresh-water bivalve shells were found.

(c) *No. 6* in the series; it had about the same dimensions as the last, but was perhaps a little higher. Near the level of the original surface were four skeletons; a fifth, probably intrusive, was at a depth of one foot. The latter was in a bed of ashes, and the bones were blackened and charred.

(d) *No. 7* in the series; contained one skeleton which was entirely and closely covered with rocks; charcoal and burned stones were above and outside of this rock covering.

At *Bellevue*, White <sup>196</sup> examined a shell-heap which was composed of the shells of eleven species of *Unio* and one species of *Alasmodonta*; the bones of deer and buffalo, potsherds, and flint arrow-heads were found.

At *Sabula*, on the Mississippi River, a shell-heap contained shells of ten species of *Unio*, the bones of deer, wild goose, snapping-turtle, soft-shelled turtle, catfish, sheephead, and various undetermined fragments. Coarse potsherds, with bits of pounded shell in the paste, were found.—— These two shell-heaps show the mode of cooking in use among the makers; small pits were dug in the bank soil; these were  $\frac{1}{2}$ -yard wide and of the same depth; the sides and bottom show action of fire; these are closely filled with shells and bones; charcoal occurs; in the original article White gives a list of the species represented, and estimates the age of the heaps at a minimum of two hundred years.

## JEFFERSON COUNTY.

Negus <sup>103</sup> describes an iron cross, which at an early date was planted on a sandstone bluff overlooking the Cedar River; near by is a series of mounds 25 to 50 feet in diameter, and 3 to 5 feet high.

## JOHNSON COUNTY.

Webster <sup>189</sup> reports that there are at least one hundred mounds known along the Iowa River in this county. There are two classes: (a) The more common; circular, with round or flattened top; from 12 to 24 feet in diameter, and from  $1\frac{1}{2}$  to 3 feet high. (b) Long and narrow; sometimes forming an extension of mounds of the first type; from 12 to  $13\frac{1}{2}$  feet wide; from  $1\frac{1}{2}$  to 2 feet high.

In detail he describes:

Five miles north of *Iowa City*: Group of eighteen mounds in a slightly curved line, upon summit of a high, narrow ridge between the Iowa River and Sanders Creek.

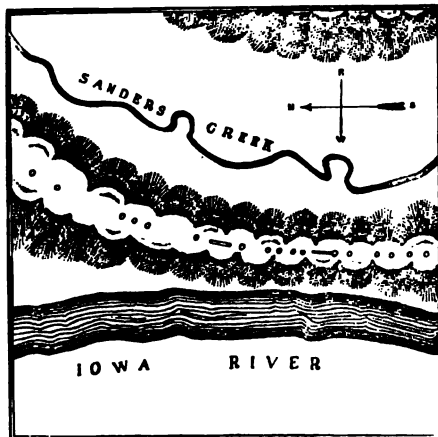


FIG. 15.

No.	Width.	Lgth.	Ht.	Direction.	Dist.
1	24		2	From to—	—
2	20		2	N.	54
3	18		2	N.	45
4	16		$2\frac{1}{4}$	N.	40
5	24		3	N.	72
6	12	130	$1\frac{1}{2}$	N.	33
7	18		2	N.	36
8	17		$2\frac{1}{2}$	N.	15
9	15		$2\frac{1}{2}$	N.	48
10	15		2	N.	30
11	16		$2\frac{1}{2}$	N.	75
12	$13\frac{1}{2}$	45	$1\frac{2}{3}$	N.	33
13	14		3	N. by N. E.	30
14	17		2	N. by N. E.	125
15	12		$1\frac{1}{2}$	N. by N. E.	24
16	24		2	N. by N. E.	24
17	19		3	N. by N. E.	170
18	24		3	N. by N. E.	90

No. 1. (Southernmost.) Skeleton, adult, seated; small, animal-shaped vessel of pottery.

No. 2. Bones of a child. These and last badly preserved.

Most of the series contain bone fragments, and many have a layer of charcoal and ashes a few inches above the human remains; also, small stones somewhat burned.

No. 11. An arrow-point, flint-chips, small boulders.

JOHNSON COUNTY—*Continued.*

*No. 6.* A circular mound with long oval mound attached.  
No relics.

*No. 12.* Somewhat like *No. 6.* Unexplored.

The general material of all is yellow, homogeneous loëss, with dark earth above. No dug holes in the neighborhood. All are wooded.

Davis,<sup>40</sup> apparently in reference to this same group, states that when skeletons were found they were usually sitting, or lying



FIG. 16.

down with legs bent as if for sitting; the skeletons were covered with wood ashes from 1 inch to 1½ inches deep; one male adult cranium was small, although the upper jaw was very large.——In this reference a clay vessel or jug is said to have been found with a child's skeleton (cf. Webster's mound *No. 12*) This vessel is described here and also by How.<sup>79</sup> It is grayish-black, with a round body 3 inches in diameter; on one side is a circle with two cross-lines and some dots; the top part narrows to a neck and is developed to resemble a turtle's beak; a spout or aperture on one side has about the diame-

ter of a man's finger; the material is pounded stone with clay; the vessel is hard-burned, and is rough and unglazed.

On the other side of the valley and further down is a group of five round mounds upon a high ridge.<sup>189</sup>

At the mouth of Turkey Creek is a circular mound on the brow of a limestone cliff 100 feet high.<sup>189</sup>

JOHNSON COUNTY—*Continued.*

Near the mill one-half mile north of Iowa City are two series of lines of circular mounds upon the top of a high, narrow ridge; the mounds are 20 to 21 feet in diameter and 30 feet apart; in their arrangement they follow the form of the ridge.<sup>189</sup>

One-half to three-fourths of a mile north-west of the mill there are from fourteen to sixteen long and circular mounds; many have been plowed away.<sup>189</sup>

White <sup>193</sup> mentions mounds along the bluffs of the Iowa River between Iowa City and Columbus Junction (Louisa County); he particularly mentions a numerous group just below the mouth of the English River; these may be in Washington County—not in Johnson.

## KEOKUK COUNTY.

Bassett <sup>162</sup> describes stone and copper implements from Keokuk County.——Morgan <sup>161, 210</sup> reports the finding of pottery at a depth of 20 inches in a mound near Richland; the mound was 250 feet in base circumference and 2 feet high; some of the vessels were very large and shaped like "a common dinner-pot;" around the rim was, frequently, a narrow band divided into triangular spaces filled with parallel lines running vertically and horizontally in alternate triangles. These largest vessels are said to have been 9 feet in circumference, and to have contained human bones.

## LEE COUNTY.

Myers <sup>98</sup> reports mounds near *Wever* and *Jollyville*; one near the latter place is on the property of John Junge; one in Layton's meadow had a diameter of 32 feet, a length of 50 feet, and a height of 7 to 9 feet.——The same author reports on the Myers Farm, *Green Bay Township*, some fifteen or twenty mounds; there are others on adjoining farms. All are oval, 12 to 30 feet in diameter, and 2 to 7 feet high; some yielded flint, pottery, and human or animal bones; some of the human bones were charred or burned.——In one mound thirty-two skeletons were found, sitting, in limestone vaults made by setting slabs on edge and covering them over with other slabs; some of these slabs weigh 250 to 275 pounds; no limestone beds are nearer than one and one-half miles.

LEE COUNTY—*Continued.*

Six miles north of *Fort Madison*, according to Negus,<sup>104</sup> are mounds 30 feet by 15 feet. They are described as divided into compartments, each occupied by a skeleton, seated, with heads on knees; articles of flint, stone, and bone were buried with them; bones of animals and birds and charcoal were found; the floors, sides, and roofs of the compartments were of limestone slabs. This is apparently the same locality as the preceding.

Negus<sup>104</sup> and Norris<sup>174</sup> mention mounds at or near *Montrose*. The latter author also mentions some near the junction of the Des Moines and Mississippi Rivers. Thomas<sup>221</sup> states that these last contained only decayed human bones, potsherds, and stone chips; some yielded articles of intrusive burial.

## LINN COUNTY.

Starr<sup>164</sup> describes a shell-heap in *West Cedar Rapids*, on a knoll near the Cedar River. The layer of shells is almost 1 foot thick; it is overlaid by dark soil and underlaid by sand. *Unio metanevrus*, *U. alatus*, and *U. rugosus* were recognized; one or two bone fragments, flint chips, and potsherds were found; also two flint implements at surface.

Bettisworth<sup>22</sup> locates several mound groups near *Cedar Rapids*. The list is as follows:

Group.	Location.	Number of Mounds.
1.	N.-W. $\frac{1}{4}$ S.-W. $\frac{1}{4}$ Sec. 35, Twp. 83, R. 7.	11.
2.	S. $\frac{1}{2}$ S.-E. $\frac{1}{4}$ Sec. 16, Twp. 83, R. 7.	14.
3.	S. $\frac{1}{2}$ N.-W. $\frac{1}{4}$ Sec. 16, Twp. 83, R. 7.	11.
4.	N.-W. $\frac{1}{4}$ N.-E. $\frac{1}{4}$ Sec. 17, Twp. 83, R. 7.	3.
5.	N. $\frac{1}{2}$ N.-W. $\frac{1}{4}$ Sec. 20, Twp. 83, R. 7.	11.
6.	E. $\frac{1}{2}$ Sec. 18, Twp. 83, R. 7.	11.
7.	W. $\frac{1}{2}$ Sec. 18, Twp. 83, R. 7.	11.
8.	N.-W. $\frac{1}{4}$ N.-W. $\frac{1}{4}$ Sec. 24, Twp. 83, R. 7.	12.

Group 1 is situated upon a divide crest running north and south; the mounds are about 30 feet in diameter and 3 feet high; usually they are separated by about two diameters; counting from the south, numbers 6 and 7 are nearer together. Groups 2, 3, 5, and 6 are quite similar to 1. Group 4 is on a bottom instead of upon a divide. In group 7 there are eight mounds in line, then a valley, and then three more mounds on the next

LINN COUNTY—*Continued.*

ridge north. Group 8 comprises twelve mounds on the crest of a divide passing around the head of a ravine; the line follows the curve of the divide.

## LOUISA COUNTY.

Gass <sup>63</sup> states that groups of mounds are thickly scattered along the bluffs overlooking the Mississippi Bottom for many miles. Quite extensive investigations have been carried on in *Grandview Township* by Gass and Blumer. <sup>23</sup> The descriptions lack definiteness; a carefully made map of the district is desirable.

*Sec. 11* (Wagner Farm). Gass <sup>71</sup> locates here a group of thirty-six mounds; the largest are 6 feet high. Many had been previously opened with no results; he opened seven.

(a). At 6 feet down an ash-bed was found, with fragments of pottery and two implements of igneous rock.

(b). The largest of the group; at 6 feet down, on the east side, was a large piece of limestone with a few pieces of pottery upon it, with an arrow-head, and a clay figure of a human head an inch in diameter and showing action of fire; on the west side was a piece of limestone with a small stone axe and a discoidal stone near it. In the other five nothing was found.

*Sec. 13.* Gass <sup>71</sup> explored two mounds in this section; they were about 4 feet in height.

(a). Bed of ashes containing bits of pottery and flints was found.

(b). Yielded potsherds.

A group of ten or more mounds occurs in the north-east corner of the north-west quarter of the section, on Viblen's Farm. Gass <sup>63</sup> explored four of these with some result:

(a). Thirty feet in diameter; 3 feet high. At 3 feet down some bones were found.

(b). Fifteen feet distant from (a); 30 feet in diameter; 2½ feet high. At 2½ feet down were one arm-bone and one leg-bone.

(c). Oval; 15 feet by 30 feet. At 3 feet down were two skeletons in clay.

(d). Twenty-five feet in diameter; 2½ feet high. A few decayed bones were found.

Kallenberger had opened six others of the group without finding anything of interest.

LOUISA COUNTY—*Continued.*

*Sec. 13* (S.-W.  $\frac{1}{4}$ ). Gass <sup>63</sup> describes here three mounds, which are numbered by him as a northward continuation of a group in *Sec. 24*. They are one and one-half miles north of those.

*No. 8*. Three hundred yards from the edge of a bluff in the centre of a number of smaller ones; it is 80 feet in diameter and 6 feet high; the upper covering is of mixed soil; at 6 feet were three horizontally-placed skeletons, one with the head toward the east, the others with head west; the skulls were badly decayed; south of these were ashes and coals, with burned clay and flint fragments; no relics.

*No. 9*. On Gast farm, one-eighth mile south of *No. 8*, in the N.-W.  $\frac{1}{4}$  N.-W.  $\frac{1}{4}$  *Sec. 24*. It measured about 80 feet in diameter and 6 feet in height; it was isolated, at two hundred yards from the edge of the bluff; at 6 feet down were ashes and charcoal, <sup>71</sup> also two arrow-heads.<sup>63</sup>

*No. 10* (N.-E.  $\frac{1}{4}$  N.-W.  $\frac{1}{4}$  *Sec. 24*). On the Godfrey Farm; two hundred yards from *No. 9*, at the edge of a bluff overlooking the valley of the Mississippi; 25 feet in diameter; 4 feet high. At 1 foot a mass of decayed bones forming a bed 5 or 6 feet across and  $3\frac{1}{2}$  feet thick; <sup>71</sup> also <sup>63</sup> emitting a stench.

*Sec. 14* (S.-E.  $\frac{1}{4}$ ). On the bluff facing and overlooking the Mississippi River, one-fourth mile back from the edge of the bluff, Gass <sup>70</sup> describes two earth-walls from ravine to ravine; the southern wall is 24 rods long; the northern one is 21 rods; the south wall is now 6 feet high, and the ditch on its north side is 20 feet wide and 5 feet deep; the north wall is 5 feet high, and on its north side is a ditch 12 feet wide and 5 feet deep. The ravines are steep-sided and are 100 feet or more deep; on the ravine slope, near the top, at three rods south of the south wall, is a circular excavation nearly 100 feet in diameter and 15 to 20 feet deep, partly excavated, partly on down-side built up; at the lower end is a passage-way through the wall, of doubtful antiquity. At the bottom of the ravine to the west are two springs, the north one pure and cold, the south one sulphureous; the area is overgrown with large trees.

This locality may be the one referred to by Stevenson.<sup>168</sup> He speaks of a group of twenty-five or thirty mounds arranged appa-

LOUISA COUNTY—*Continued.*

rently in parallel lines, the whole being in a plot twenty-five or thirty rods in diameter. It is at the south of Muscatine slough. From this group an earthwork or causeway extended west to another row of mounds about forty rods distant. This earthwork runs in a straight line, but it has a jog or break in it where is found a depression in the ground about 80 feet in diameter. The ends of these two lines are about a rod apart, but both walls follow the same direction.

*Sec. 24* (N.-E.  $\frac{1}{4}$  N.-W.  $\frac{1}{4}$ ). Godfrey Farm; mounds opened here at different times by Gass; <sup>63</sup>, <sup>71</sup> two, about 4 feet high—

(a). At 4 feet a horizontally-placed skeleton, with the head west; a small flint knife was obtained here.

(b). Twenty-four paces south of the preceding; at 2 feet down was a bed of ashes 1 foot thick; the clay above it was burned; in the ash-bed were several small, white stones, like unfinished pipes, which crumbled; they were apparently limestone. Two other mounds yielded a sandstone bird pipe, a copper axe, and a large copper bead.

*Sec. 24* (S.-E.  $\frac{1}{4}$  N.-W.  $\frac{1}{4}$ ). On the Schleicher Farm; Gass<sup>63</sup> opened two mounds.

*No. 1.* About 75 feet in diameter; 4 feet high; at 4 feet depth were two leg-bones and fragments of pottery and flints.

*No. 2.* Thirty-five feet south of last; 50 feet in diameter; 3½ feet high; yielded a few bones.

*No. 3.* On Godfrey Farm, thirty feet south of *No. 10*; 30 feet in diameter; 3 feet high; at 3 feet down were two skeletons.

*No. 4.* Thirty-five feet north of *No. 2* (?); 30 feet in diameter; at 1½ feet deep the earth became a burned clay; at 1½ feet deeper it was a soft brick-like material; below this was an ash-bed of oval form, 4 feet by 5½ feet, 11 inches thick; near the centre of this bed was a small copper axe showing action of fire; no bones.

*No. 5.* Thirty-six feet north from last; 30 feet in diameter; 3 feet high; at 4 feet depth were human bones, broken pottery, flint implements.

*No. 6.* Forty-six feet from the last; 30 feet in diameter; 3 feet high; at 3 feet down a few bones.

*No. 7.* Forty-five feet north-west, on Rothrock Farm; 100

LOUISA COUNTY—*Continued.*

feet in diameter; 6 feet high; at 2 feet down were three badly decayed (intrusive?) skeletons; on the south side were two skeletons, male and female, heads west and east respectively, and feet meeting at the centre. The material for 6 feet was mixed black earth and clay.

*Sec. 24* (N.-W.  $\frac{1}{4}$  S.-E.  $\frac{1}{4}$ ). Group of six mounds in crescent, on prominent point of bluff; west of the group is a field containing hundreds of mounds. Two of the group are particularly mentioned by Gass.<sup>63</sup>

(a). The southernmost of the group, in the extreme north-west corner of the S.-E.  $\frac{1}{4}$  of the section. It is about 100 feet in diameter and 8 feet in height; for 6 feet—"down to original soil"—it consists of mixed earth with flint fragments; next a layer  $1\frac{1}{2}$  feet thick of clay and sand, in which was a flint knife and a perforator; below this were four skeletons with heads west, and some bones and skull fragments; near the second skeleton was a dark red stone pipe and a small copper axe; another excavation on the east side yielded two skeletons, with two pipes near the skulls, a portion of the bones of a child, and a few copper beads.

(b). Forty-five feet north-east of the last; 45 feet in diameter;  $3\frac{1}{2}$  feet high; at 4 feet down were three badly decayed skeletons with heads toward the west; fragments of flint and pottery were found. These two mounds were excavated by Mr. Kallenberger.

*Sec. 25* (S.-W.  $\frac{1}{4}$  N.-E.  $\frac{1}{4}$ ). Blumer<sup>23</sup> reports regarding the mounds at the extreme edge of the prominent point of the bluff; ravines open into the valley at either side.

*No. 1.* It is a flattened cone, 30 feet in diameter and 3 feet high; the first  $1\frac{1}{2}$  feet were of hard clay showing here and there fire action; next came a layer of hard red burned clay, oval in form, 5 feet in shorter diameter, 3 feet thick at centre, diminishing to 3 inches at the edges; then came a body of ashes, 13 inches thick at middle and diminishing outward to the edges; in this bed, a few inches from the bottom, were a part of a carved stone bird pipe, a small copper axe, and an elephant pipe.

*No. 2.* Farm of P. Haas, fifty yards west of No. 1, in the second row of the group, extending north and south, approxi-

LOUISA COUNTY—*Continued.*

mately parallel to the edge of the bluff; the mounds about here are arranged in several somewhat irregular rows, all running the same way. This mound is 15 feet in diameter, and  $1\frac{1}{2}$  feet high; it was of mixed earth to a depth of 3 feet, where was natural yellow clay; at bottom were parts of a badly decayed human skeleton and some splinters of flint.

*No. 3.* Close to bluff-edge in first row, at fifty yards south of *No. 1*, 20 feet in diameter; 2 feet high; at 2 feet from top was an excavation into the natural soil,  $1\frac{1}{2}$  feet in diameter and 2 feet deep, full of ashes and charcoal.

*No. 4.* Fifty yards south of *No. 5*; with a diameter of 25 feet, it has a height of 3 feet. It consisted of mixed soil for 3 feet, and then of a hard layer of white clay eight inches thick.

*No. 5.* Ten yards west of *No. 4*, and in the second row; it is 25 feet in diameter and  $3\frac{1}{2}$  feet high; it consisted for  $2\frac{1}{2}$  feet of mixed soil resting on white clay 11 to 15 inches thick; below this but to one side of the middle was a small quantity of ashes and charcoal; in the centre at 2 feet or so down was a sitting skeleton; no relics.

*No. 6.* At nine yards north from *No. 5*, in the second row; it measured 20 feet in diameter and  $2\frac{1}{2}$  feet high; it consisted of a mixture of common soil resting on hard natural clay; a few fragments of decayed bones were found, but no relics.

Numbers 4 to 6 are on Stoddard's farm. The rest of this series are probably on Haas' farm.

*No. 7.* Sixty rods north from last, on the second row; 15 feet in diameter;  $1\frac{1}{2}$  feet high; composed of soil like *No. 6*. No bone fragments and no relics.——Gass<sup>63</sup> speaks of eight mounds in this quarter-section, and enumerates as relics from them a plain red pipestone pipe, a few shell beads, an obsidian arrow-head, a number of flint implements.

At *Blackhawk*, opposite Mercer County, Illinois, near the Mississippi River, on a high bluff facing New Boston, are seven or eight mounds, the largest in this part of the West. They are 4 to 5 rods in diameter, and 12 to 15 feet high; one yielded numerous partly decayed bones, also pottery, flint implements, and flint clippings. On the high level plain back of the mounds was an old embankment enclosing some 5 or 6 acres; it is now

LOUISA COUNTY—*Continued.*

nearly gone, but potsherds, flint chips and flint implements are picked up within its area; the pottery paste is of river mud mixed with pounded fresh-water shells (Shaw <sup>157</sup>). Probably the following description by Stevenson <sup>138</sup> refers to this same locality. He describes it as in the vicinity of Toolesboro:

"A raised circular earthwork; it resembles a horseshoe. The open part abuts upon the edge of the bluff among a group of mounds. The surface and soil are covered or supplied with an immense quantity of broken pottery and flint chips and implements. These last are nearly all small, uniform in shape and size; they are like a half-cone in form and are  $1\frac{1}{4}$  inches long,  $\frac{3}{4}$ -inch wide at broadest part,  $\frac{3}{8}$ -inch thick at thickest." Apparently "the circular enclosure of 10 acres" mentioned by Alexander.<sup>2</sup>

This work is also described by Toole <sup>179</sup> and by the Davenport party. The latter give considerable detail, thus: One-fourth mile north-west of these mounds was an earthwork enclosing some 15 or 20 acres; octagonal in form, the sides are curved and the inner edge is circular; the embankment, once about 2 feet high, is now nearly obliterated; the area is strewn with flint chips and potsherds; in a few hours fifty or more flint implements were found, among them a few arrow-heads; most, however, were well worked, plano-convex objects, from 1 to 2 inches long, about half as wide and  $\frac{1}{4}$ -inch thick, rounded at each end but with one more tapering than the other, even bluntly pointed at times; (the form is somewhat like a flat-iron without a handle). The pottery from this site is unlike that from the mounds; it is grayer, and composed of mixed earth and shell; broken handles are common.

Remains somewhat like stone walls also occur.<sup>138</sup>

Three miles south of *Toolesboro*, near Iowa River, are outlines of three ancient structures in which stones were used. The material was granite boulders from the river below. There were five or six such structures in a line, nearly parallel to the river bank, about twenty feet from it, about 6 feet square and some 20 feet apart. Few stones are left; the best preserved showed evidences of fire upon being opened; the bottom was rather dark and burned almost to brick for 2 inches in depth; a double row of slight depressions, less than two feet deep, alternate with these

LOUISA COUNTY—*Continued.*

remains; in some were charcoal, flint chips, and split and broken bones of animals.<sup>138</sup>

*Toolesboro.* Parties from the Davenport Academy <sup>127, 204, 205</sup> explored a group (*a*) of mounds on the edge of the bluff overlooking the Iowa River bottom two and one-half miles from its mouth. Three-quarters of a mile south is another group of six or seven mounds (*b*).

(*a*). Mounds from 40 to 80 feet diameter and from 6 to 10 feet in height, composed of a hard mixture of clay and black soil, both of local origin. They are burial mounds but the bones contained in them were not numerous and were poorly preserved. Most of them contained oak logs 6 to 8 inches in diameter placed at or near the bottom of the mound and much decayed; the bones were most frequently immediately beneath these. Some mounds were opened. In *No. 1* a few flint chips and scattered human bones were found. In *No. 2* the decayed wood was found at depths of 6 to 9 feet. The logs showed no arrangement; but skeletons were found more frequently below them than elsewhere. Portions of skeletons (including a child's skull) were found, all too badly decayed to be of use. Near one skull was a neatly carved pipe of gray pipestone representing a bird, with eyes of pure copper; also a copper awl about six inches long, hammered square instead of round and bent at right angles and flattened near one end. Mound *No. 3* was opened fully. It was composed of mixed earth; the large sticks of wood were found near the base in positions showing no arrangement. There were many irregular layers of about  $\frac{1}{16}$  inch thickness looking like white ashes; such were usually found in contact with the wood on the under side. The mound was built of firm, hard, light-colored clay, apparently the original earth of the locality stripped of its black soil. A layer of tough yellow clay about an inch thick was placed upon this. The bones, implements, etc., were directly upon this layer. No such clay layer was in *No. 1* or *No. 2*. Two or three very fragile skeletons were here; a large marine shell—*Cassis madagascarensis*— $7\frac{1}{2} \times 10\frac{1}{2}$  inches, holding about  $5\frac{1}{2}$  pints and cut out to serve as a vessel; with it and near one skull were parts of four earthen vessels; these were crushed or fragile. They had contained river shells. A few feet from this was an-

LOUISA COUNTY—*Continued.*

other skull and other portions of the skeleton. Near the head, as if laid upon the chest, was a smoothly-wrought copper axe, showing impressions and traces of cloth; some two hundred poorly-preserved beads of shell and some pearls were about the head and in the skull; a few feet away were two carved stone bird pipes, one of red pipestone with pearl eyes; close by were two more copper axes.

*No. 4.* Another copper axe, a copper awl, and several small sandstone implements were found in a mound on the bluff by Mr. Freeman; they were exposed by washing away of the bank. An arrow-head of flint was found in each of these mounds where any other relics were found.

*No. 5,* on Mrs. Mallory's property,<sup>205</sup> was explored in 1866. Probably its original height was 8 to 10 feet. It was composed of very hard mixed earth, with minute bits of charcoal scattered through it; at 4 feet 4 inches down was an evenly spread layer of quite clean yellow clay  $\frac{1}{2}$  to 1 inch thick; this was slightly below the original surface. At half-way down a small rough chert knife or scraper was found; at the west end were poorly-preserved human bones, including a frontal bone of remarkably low and brutal character; here also was a much broken turtle shell. At the middle of the mound was a finely made plain gray pipestone pipe; no remains were near it. The clay floor was found to stop (on the west and south?) along a sharply defined diagonal line. In the part of the mound beyond it was a grave, 20 inches or so deep, containing a much decayed adult skeleton with its head to the north-west, and some child bones; another adult skeleton lay at right angles to the first; the grave pit containing these was irregular in form, measuring 8 feet along the south-west side, 7 feet on the north-west, and 6 feet and 5 feet along the others.

*No. 7* <sup>205</sup> was symmetrical, one of the largest of the group; circular, with a diameter of 85 feet; the height, reduced by cultivation, was about 10 feet. The excavations brought to light about 500 square feet of the base. The construction showed that a floor of light-yellow sandy clay had been laid upon the original subsoil of pure clay. The mound was raised upon this to a height of about 4 feet when it was covered—at least on its south half—with logs of oak irregularly laid on. Some white ash-like mate-

LOUISA COUNTY—*Continued.*

rial is found in this part though there is no charcoal or other evidence of fire. On the north side the logs are lacking, but there is a thin layer of pure clay. The material of the mound above this layer of wood and clay was a very compact stiff clay loam, with scattered patches of purer clay. In the northern part some flint chips were found. About midway of the trench and two feet from the floor some human bones were found (two femurs, a clavicle, several bones of the left forearm and hand) all in a heap, and with them a small worked flint. Several feet west of the trench a copper awl was found standing upright and firmly imbedded in the clay base. Two feet beyond this and to the south (?) were found four copper axes, two curved base pipes (one cylindrical bowl was of calcite, the other of catlinite, hawk-shaped, with pearl eyes), a large block of mica in loose sheets, a second awl, a crushed skull with skeleton attached. Under this skull one of the axes lay, wrapped in a covering of cloth and bark. Another copper axe lay under the left shoulder of the skeleton, and many dull and fragile beads of shell and pearl were taken from the region of the neck and chest. Further excavation in this same mound revealed an adult skeleton, male, with face up and head to the north-west; close by the right side, with head on the level with the shoulders of the larger skeleton, was the skeleton of a child of ten years. Beyond it was a third copper awl; about the legs and feet were shell beads. Three more copper awls pierced the floor and stood upright in a line, from 18 inches to 36 inches from the feet of the skeletons; the awls were about two feet apart; these awls were from 4 to 7 inches long, hammered square except at lower pointed end; they are turned abruptly at the top; their diameter is about  $\frac{1}{8}$ -inch. They may have served to peg or pin down a skin or cloth covering placed over the dead. The hard floor appears to have been basin-shaped.

*No. 8.* Two hundred feet west of *No. 7*; this was the largest of the group. It has been used by white men as a building site. It has a diameter of 140 feet; a height of 11 feet. At 9 feet down was a floor of yellow clay  $\frac{1}{2}$ -inch thick, laid upon the original black loam surface; just above this clay floor was black earth. Parts of four much decomposed skeletons were found, but no relics.

LOUISA COUNTY—*Continued.*

Four other mounds here were opened by Toolesboro gentlemen in 1875. They were situated on the edge of a bluff; the region was covered with a growth of oak. The farm was owned by Mr. J. J. Parsons. The structure was much as in those already described.

(a). Largest of those opened; 40 feet in diameter, 8 feet high; the bulk of the mound—140 cubic yards—was removed; at the level of the natural surface was a thin layer of sand on which were a large copper axe of  $2\frac{1}{2}$  pounds weight and of unusual form, a thin flat perforated bone implement, and several round stones; several skeletons also.

(b). Half as large as last; no floor layer. Five copper awls, one flat-sided square-edged axe, a carved pipe of mottled red pipe-stone, representing a panther or lynx, several flint arrows, a large lump of galena.

(c). Small mound; considerable quantity of broken pottery, a number of pieces of elk (?) horn several inches in length,  $1\frac{1}{4}$  inch in diameter, and rounded over one end as if used for pestles.

(d). 25 x 50 feet in diameter; 5 to 6 feet high; quantity of human bones at  $2\frac{1}{2}$  to 6 feet deep; all crumbling. An unfinished pipe of soft whitish stone; several horn implements like those from c. One of a group on the other side of the village back from the bluff, opened in 1880 by Hindman.<sup>204</sup> It was 30 feet in diameter; 3 feet high. A skeleton, two earthen vessels, (one near the head, the other opposite the middle of the body) badly crushed, lay at its right; the one near the head contained ashes and earth; a foot above the head a large piece of mica and a piece of obsidian (two pounds weight), were found near the centre of the mound at the same level with the skeleton.

Stevenson also mentions investigation here.<sup>168</sup> Two companion mounds excavated; out of line and away from bluff some forty rods. They were about 40 feet diameter and 5 feet or more high.—— In one (a) a copper celt among fragments of bones, charcoal, and a decayed mass of wood; it was  $5\frac{1}{8}$  inches long, from  $\frac{3}{8}$  to  $2\frac{1}{4}$  inches wide, and  $\frac{5}{8}$  inch thick; weight 1 pound.—— On a level with the axe but 8 feet from it a beautiful earthen pot, 5 inches deep and 6 inches diameter, with rounded base. Close to it a miniature pot in bad condition. Near the vessels, many

LOUISA COUNTY — *Continued.*

fragments of bone and teeth, and beneath them charcoal and flint chips. In the other mound (*b*) at about 6 feet depth, a fragment of sheet copper weighing 260 gr. It was  $4\frac{1}{8}$  inches long, 2 inches wide, and about the thickness of ordinary tin. It was slightly curved and found in the bottom of the mound lying in puddled clay. This bottom was dish-shaped, rounding up at the edge, 1 foot deep and 6 or 8 feet across. It lay below the original surface.

Gass<sup>71</sup> mentions a tablet found in a Toolesboro mound by Mr. Potter; it was taken from a depth of 13 feet where it lay on a small pile of bones; it is made of white sandstone, 2 feet by 3 feet, and 3 inches thick, is rounded at corners and bears some old signs or pictures on one side; some English letters have been recently added.

The second "Elephant pipe" in the Academy's collection came from Louisa County and was found by Peter Mare in his cornfield.<sup>142</sup>

The material regarding the Toolesboro mounds is somewhat confused. Numbers 1 to 4 of the group A are so numbered for convenience here and may not have been so numbered by the original investigators.

## LYON COUNTY.

Thomas<sup>174</sup> cites Wakefield as to mounds on sections 13 and 24, Twp. 100 N., R. 49 W., and Fulton<sup>59</sup> speaks of mounds with circular terraces, 15 to 20 feet in elevation, and of remains of re-doubts and breastworks.—— More definite is the work of Starr and Lewis.

The former<sup>167</sup> describes mounds and stone circles a mile beyond Brown's Station (La Valley) near the Little Sioux River and close to the Dakota line. The mounds are mostly round, 30 to 50 feet in diameter, 3 to 8 feet high; a few are oval and larger. On the summit of the ridge are stone circles or ellipses made with some care with boulders. Some mounds lie among the boulder circles but most are outside the circle-bearing area. The whole ridge top is strewn with flint-flakes, arrow-heads, scrapers, potsherds, etc. Good stone mauls are not uncommon. White and Starr opened two mounds. No. 1 was of hard gravel with patches

LYON COUNTY—*Continued.*

of ashes. At 2 feet down was a skeleton with head to the north; the bones were well preserved; no relics found.

*No. 2.* Above was gravel; then black soil; then ashes and black soil; lastly gravel. Some fragments of bones and potsherds were in the black soil and the ashes and black soil.——Two other mounds previously opened by Nash and Cotton lay on south side of railroad.

*No. 3.* On a lofty ridge; two adult and one child skeletons; also the bones of a horse; also a pipe here. Lower down was an adult skeleton, with a dog's skeleton wrapped in buckskin; here were six iron bracelets, fifteen feet of wampum, a grinding stone, and a red pipestone disk pipe. The skeleton had copper ear ornaments the oxydation of which had preserved the skin and hair in contact with them. This mound was within a stone-circle.

*No. 4.* Yielded a finely made discoidal stone, an arrow-head, a small maul of reddish granitic rock, part of a jar, and some hard bone fragments. Two lines of stones, six or seven feet apart, crossed the ends of this mound. The discoidal stone is of fine-grained, dark material, beautifully polished; the two round faces are concave and the truly circular outer rim is convex; the specimen is about 6 inches in diameter and is perforated by a central hole of about half an inch in diameter; the thickness varies from less than half an inch at the inner edge to  $1\frac{1}{2}$  inches at the thickest part. For fuller particulars regarding the stone circles see references. <sup>165, 167</sup>

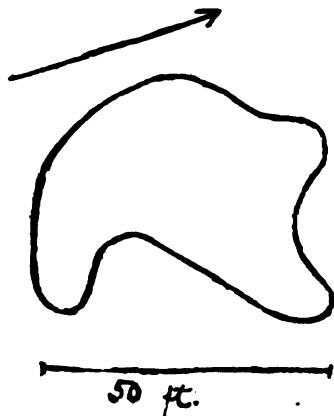


FIG. 17.

ered it. This one was 33 feet diameter.——In another paper

Lewis <sup>85</sup> redescibes the boulder circles and rings described by Starr.

——South of the track he mentions a large inclosure or fort, with low walls. Within are *no* circles though there are some without.——Less than a mile north of this locality is another, where stone circles formerly existed. Many have disappeared. One part circle being visible the rest was dug out from the soil which had covered it.

LYON COUNTY — *Continued.*

the same author gives further particulars.<sup>87</sup> He states that the mounds north of the railroad number one hundred and five and that one of them is a rude effigy, which measures  $55\frac{1}{2}$  feet in greatest length and  $2\frac{1}{2}$  feet in height (Fig. 17). He also describes the enclosure south of the track more fully. It encloses an area of about 15 acres; the walls are from  $1\frac{1}{2}$  to 2 feet high and average 18 feet in width; the fort was built after the mounds and seven of these are within or about the fort.

## MARION COUNTY.

Robinson mentions mounds in the county. Kimberling<sup>109</sup> examined mounds at *Knoxville*. They occur in groups of five to ten in a straight line or a circle and always on bluffs or highland; in one case there was a raised way some 20 rods long, 8 or 10 feet wide, and 1 foot high, leading to an abrupt bluff. The mound structure is described thus: "2 feet of soil; 16 inches of hard baked clay, ashes and charcoal; 5 feet below the clay layer, a hearth, 2 feet by 4 feet and 10 inches deep, full of ashes and charcoal; the walls of 'the furnace' were glazed by heat; the arch is 12 feet in diameter and its height such that a tall man might stand under it. In the centre of the mound was a piece of cement with a crushed human skull below it."

## MILLS COUNTY.

Dean<sup>41</sup> and Proudfit<sup>138, 139, 140, 141</sup> have made considerable investigations. Mounds and lodge circles are common on the loess bluffs of the Missouri River. The mounds are usually small, simple, conical, from 20 to 100 feet in diameter and from 2 to 15 feet high; they yield an occasional chip of flint or fragment of pottery; they are almost always associated with lodge circles.—— These last are circular excavations from 20 to 60 feet in diameter, with a present depth of 5 feet to 4 feet; the original floor was the bluff clay; this often lies buried under 2 feet of black soil; the soil removed in excavation is sometimes piled up in a ring, still remaining as a wall along the outer edge; in one case an oak stump 18 inches in diameter was found in the centre of the lodge circle; these circles are usually on a divide, sometimes on a south slope. A single lodge is an exception; usually they occur in groups.

MILLS COUNTY—*Continued.*

*Oak Township*, S.-E. corner S.-W $\frac{1}{4}$ , Sec. 8, Twp. 73 N., R. 43 W., Allis Farm, on a spur of the bluffs, fifty feet above the plain, some four hundred feet north of a deep ravine, is a group of five lodge circles. The depressions are fairly marked, vary from 20 feet to 30 feet in diameter, and, although considerably filled, from 1½ feet to 2 feet deep. The ground about is strewn with chips, sherds, and occasional arrow-heads, knives, etc.; fragments of an arrow-straightener of sandstone, some paint stones and some mussel-shells were also found.——On the site of another lodge, south of the ravine, was a catlinite pipe.

One mile west of *Glenwood*, partly on the T. D. Tipton farm, is a series of seven lodge circles extending along a crescentic ridge for three-fourths of a mile. With these is a mound. This is located five and a half miles south and two miles east of the preceding locality, near N.-W. corner, N.-W.  $\frac{1}{4}$  S.-E.  $\frac{1}{4}$ , Sec. 10, Twp. 72 N., R. 43 W. The bluff is 300 feet high and overlooks the surrounding country in every direction. The mound is elliptical at base, measures 70 feet from north to south and 40 feet from east to west; it is composed of local material taken from a spot about 125 feet to the south, where there is a depression 35 feet square and 5 feet deep. At 7 feet from the top was found a layer of ashes half an inch thick; then came a layer of stones from 2 inches to 11 inches thick and weighing from 20 to 30 pounds; (these were probably brought eight miles from across the river); this layer of stones was probably placed upon the original surface and the mound then heaped over it to a height of 6 feet; an earlier exploration found a second layer of stones at that height and the original mound perhaps was several feet higher than that. No implements, bones, or traces of fire were found in the mound.——A few flint chips and a large implement, perhaps for agricultural purposes, were found near by.——Trenching across the lodge circles showed, in one case, black soil 3½ feet deep over the floor; in a second case 2 feet of black soil. In both cases potsherds, charcoal, and flint chips were found and in the latter, at the centre, a conical heap of burned earth in which was a large vessel of pottery, which was broken in the excavation.

One-half mile south of *Glenwood*, on the fair-grounds, are four still distinct lodge-circles; they are situated upon a flat,

MILLS COUNTY—*Continued.*

enclosed on three sides by heights and opening to the south upon Keg Creek. Potsherds are abundant over the area, and arrow-heads, drills, scrapers, celts and a "turtle-back" were found; the arrow-heads were small but well made.——On the crest of the south end of the encircling ridges is an ancient workshop; the place is strewn with flint chips and potsherds; at the base of the hill were found a drilled tooth for a bead, a bone implement, mussel-shells, bones, and worked flints.——On the west bank of the stream, a little east of the group of circles, was a pottery factory; great numbers of fragments occur here together with pieces of tempering stone.——The pottery of the district is rude, made of clay tempered with pounded stones; ornamentation consists of curved lines, indentations, checker-work, cob-marking and circle marks.

Half a mile east of the Tipton mound is another unopened mound, with a group of three or four circles about it.——North and west of Glenwood about four miles, on the old Pacific City road, is a low mound with accompanying lodge circles.——Five miles north of Glenwood, on the Glenwood and St. Mary's road, is a mound with several lodge circles.——Seven miles north-west of Glenwood, at the head of Indian Hollow, is a group of three small mounds and one lodge circle. This locality is four miles north of the Tipton mound.

East of Glenwood, at eight miles distance on Silver Creek are several small mounds of little elevation upon a high ridge on the east side of the creek near Lem's Mill. One mound excavated revealed great quantities of red burnt earth scattered through the mound with an occasional lump of black earth and some charcoal. No other relics. Indian graves occur on neighboring hills and corn-pits were found here early.

Three miles north of Pacific City and four miles north-west of the Tipton mound, upon a high divide, lies a mound 100 feet by 70 feet and 15 feet high; composed of surface soil, with scattered flint chips, charcoal and ashes in it, no results of interest came from its excavation. A large lodge circle is located one hundred yards south-west. A turtle-back celt is reported as found on the bluffs five miles north of Pacific City; large grooved implements have been found at Glenwood.——Of particular interest is the

MILLS COUNTY—*Continued.*

pottery vessel, entire but broken, found at 6 feet down in loëss at Glenwood (Fig. 18). It is of dark gray clay tempered with



FIG. 18.

micaceous quartz. A few bits of burned clay and pottery were found later at the same place.

Proudfit describes scrapers of flint (pink and white) well worn by use or weather, found by him at foot of bluff, one mile above the mouth of Indian Hollow, in a vertical face of exposure, 6 feet below the surface.

Remains of *Elephas americanus* have been found in the loëss of Mills County at a railroad cut (C., B. & Q.) two miles south of Glenwood and at Malvern, nine miles east of Glenwood.

This author believes that great physical changes have occurred in the region since occupied by man.——He also mentions an ancient trail running for many miles along the west crest of the bluff which is, at times, worn deeply into the surface.

## MUSCATINE COUNTY.

*Pine Creek.* (a). Group of six mounds, on a high ridge, two miles above Pine Creek. Lindley<sup>88</sup> opened one composed of yellow clay; in it were found river shells and charcoal, human skeletons lying east and west, and forty-one beads.

(b). On slope of same ridge a group of mounds forming an irregular circle. One opened was about 15 feet high and 100 feet

MUSCATINE COUNTY—*Continued.*

wide at base. Four feet below surface were two layers of flat stones. Between two of these large stones and in a cavity of the lower one was a large jet-black arrow-head. A broken skull was found, with walls one-half inch thick; one leg-bone was notched as if repeatedly struck with a sharp instrument.<sup>88</sup>

Witter<sup>199</sup> describes mounds in *Montpelier Township*, Sec. 22, Wm. Lowry Farm; group of nine mounds on top of sharp ridge running W. 10° N. One, probably the largest, opened; it was seventy-two rods from the river's low water edge, and ninety feet above it. Mounds numbered from the west. No. 1 is down the point, which slopes to the west to a creek about 40 rods distant. From the centre of No. 1 to that of No. 2 is 3.2 rods. The rise between them is about 6 feet. From 2 to 3 is 1.5 rods. 2 and 3 form a sort of double mound. From 3 to 4 is 4 rods. No. 4 was the mound opened. From 4 to 5 is 4 rods; from 5 to 6 is 4.5 rods; from 6 to 7, 3.6; from 7 to 8, 2.5, and from 8 to 9 is 6.5 rods. From No. 6 the mounds diminish almost to invisibility. No. 4 is about 70 feet diameter and 7 feet high (8 feet to undisturbed bottom). Graded down by scraper for about 3 or 4 feet. At 5 feet a quantity of flat, argillaceous limestone, averaging perhaps 10 inches in each direction. These were set on edge and in a circle, although one-third or one-half the circle on the north was wanting. This circle was 8 to 10 feet diameter and apparently surrounded the centre of the mound. The stones were nearly all at the same depth and appeared to be collected in little groups a foot or so apart. Sticks of charred wood, two feet or more in length and three or four inches in diameter, with some pieces apparently of oak trees a foot or more in diameter, were with the stones on the south side, and some of the stones were burned red with the charcoal lying on them. Near the stones and apparently forming a circle was a red material three or four inches thick and about the same in depth (apparently burned stone). Charcoal was common, flint chips *scarce*. A little inside the circle of stones and perhaps a foot below were these relics: two large marine shells, *Sycotypus perversus*, one-half of the last whorl of each. These are each 9.5 inches long with spire wanting. Their diameters are 6 and 5.5 inches. Nearly one entire whorl was found close to one shell, apparently part of another shell. (The shells were probably

MUSCATINE COUNTY—*Continued.*

four feet apart—lying horizontally.) One valve of *unio?* about a foot from one of the sea-shells. A cluster of shell beads, globular, three or four inches in diameter and containing 200 to 300 beads; badly decayed; they vary from  $\frac{3}{8} \times \frac{1}{4}$  inch to  $\frac{1}{4} \times \frac{1}{4}$ . Two feet from one sea-shell and four from the other were two vessels, round, with round bottom. (1). Uniformly  $\frac{1}{8}$  inch thickness; thicker at rim; firm, fine clay, mica, and shell fragments; no sand; many minute cavities; dark in color; somewhat polished on exterior; neck smooth; rest of surface with V ornamentation. Inside measures: at top, 3.75;  $\frac{1}{4}$  inch down, 3.25;  $2\frac{1}{2}$  inches down, 5.4; 5 inches deep; capacity 1 quart.

(2). Coarser, more fragile; from  $\frac{1}{8}$  to  $\frac{1}{4}$  inch thick. Reddish clay and crushed granite; no shells; not porous; grains of quartz and feldspar (?); light red; blackish near top. Plain; 5.25 inches at rim; 6 inches at 3 inches down; 6.5 inches deep; tapers below like small end of egg; capacity 2 quarts.

(3). Fragments of a third; red clay, sand and shell; better than (2); some indentation ornament. Human teeth were taken from two points at about the same depth as the relics. Apparently from two individuals, 8 to 10 feet apart. Two teeth are in the posterior part of the right side of the lower jaw.

Davenport parties excavated a mound in the Lowry farm group in 1875. Considerable charcoal was scattered throughout the earth of which the mound was composed; no ashes were seen; at 7 feet down was a part of the forward portion of a human skull from which at least seven *rondelles* had been cut; the bone was well preserved. No other objects were found except scattered fragments of bones within 2 or 3 feet of the surface, and a single small shell bead at 6 feet down.

(c). One-half mile below Pine Creek a group of about fifteen mounds on a high ridge. One of them is nearly 20 feet high. North of it are two elongated mounds about 4 feet high, 5 feet wide and twenty feet long. One conical mound yielded, at about 2 feet depth, two-thirds of an earthen vase; at 14 feet, remains of six persons. The bodies had been arranged radiatingly, feet inward, about a large sea-shell—*Cassis madagascarensis*.<sup>88</sup>

Harrison<sup>74</sup> examined these, opening the second one in size; it was circular, 50 feet in diameter, 9 feet high; it was composed

MUSCATINE COUNTY—*Continued.*

of light clay mixed with dark earth; from 6 feet depth downward were ashes scattered through the mass, and burned clay here and there. An ash bed of irregular form and varying thickness, dividing into two branches at about the centre of the mound was found at 9 feet down; this rested upon the natural soil; scattered pieces of sandstone, some showing signs of burning, lay above this bed; no charcoal was found; only one relic—a piece of worked bone 4 inches long,  $\frac{1}{2}$ -inch wide,  $\frac{1}{4}$ -inch thick.

Stevenson <sup>168</sup> states that from a point near Drury's Landing, a few miles east of Muscatine, to a point near Toolesboro and New Boston, a distance of some twenty miles, mounds occur on all the higher points; the groups contain from 2 to 100 or more mounds from 15 to 150 feet in diameter and from 2 to 15 feet high. He estimates that there are 2,500 mounds in this area in the two States of Iowa and Illinois.——Near the limits of Muscatine itself he claims fifty mounds and long earthworks.——Nine out of ten of the works in this vicinity are circular mounds; the long ones are from 6 to 20 feet in length and 5 feet wide and are placed end to end with a gap of 5 feet between. They are made of local material; those on the ridges of clay and sand, those on Muscatine Island of sand and gravel. Sometimes they show evidence of fire action.——A map of groups is given and some notes of explanation:

*Group 1.* Containing 20 mounds of which 10 were opened with no result except an occasional bit of charcoal or a fragment of a shell.

*Group 2.* One skeleton, badly preserved, in a horizontal position, and small potsherds.

*Group 3.* On the bluffs, overlooking Whiskey Hollow. One badly decayed skeleton, with a stone axe weighing  $2\frac{1}{2}$  pounds under its head.

*Group 4.* On Muscatine Island; nearly leveled; pottery fragments, small triangular arrows very similar in style, and flint chips are strewn over the surface of the area.

The heads of skeletons here are almost always to the north. Some mounds have a hard crust arch over the remains.

Witter <sup>155</sup> mentions an arrow-head and spear-head from the

MUSCATINE COUNTY — *Continued.*

loëss at Muscatine; a piece of *Elephas* tooth was found at the same locality. Also <sup>225</sup> flint chips from loëss on Mad Creek.

On Schmale's Farm below Muscatine Gass <sup>72</sup> examined a group of five mounds 65 feet or so in diameter and from 5 feet to 8 feet high.

(a). The westernmost; 5 feet high; at bottom were two horizontal skeletons, with heads to the east and west; the bones were badly preserved. Pieces of charcoal and pottery found.

(b). One skeleton.

(c). Eight feet high; at a depth of 7 feet was a pit 2 by 3 feet and 1 foot deep, with human leg and arm-bones and skull fragments.

(d). Six feet high; at 3 feet down were three skeletons covered with pieces of wood; at their sides were pieces of pottery and marine shells.

(e). Smallest of the series; in it were a few human bones.

All were composed of very hard clay.

One mile west of the last group, on the Hershey farm, the same writer describes a group of forty-six mounds in four concentric semi-circles; all but two are simple conical mounds; one is oval; one is long and narrow. They vary in height from 2 to 6 feet. Twelve were explored, of which some were burial mounds; there was seldom more than one skeleton present; the bones were badly decayed; ashes and charcoal occurred in all; a few arrow-heads and potsherds were found.

At the river close by relics from an old village site—potsherds, flints, bones of animals and perhaps human beings constantly wash out. They come from a depth of 2½ feet, between the black soil and the sand.

Stevenson <sup>168</sup> mentions eight or ten mounds in two parallel lines on the Cedar River nine miles north of Muscatine.

Also at nine miles south-west from Muscatine on high bluffs—Group G on the map—eleven mounds in a line along the bluff edge. They are about twenty feet apart; consist of clay and gravel, the lower part mainly the latter. Seven were opened. Most gave no objects. The largest yielded flint chips and charcoal; in one, at 18 inches depth, was an intrusive burial, while 2 feet lower was a skull above a stone axe.

MUSCATINE COUNTY—*Continued.*

Near *Wyoming Hill* Gass<sup>39</sup> describes a mound on a small area of bottom land between and close to the confluence of two little creeks, almost surrounded on every side by high bluffs, opening in front toward the Mississippi River. The base is just above high water mark. Oval in form; long diameter nearly 200 feet; more than 30 feet height; it is small and rounded on top; thirty-three layers of earth, clay, sand and gravel clearly defined; scattered charcoal fragments, some large, through it. In the bottom of the mound is an immense pile of slabs of sandstone, two or three inches thick and several feet across, disposed in layers of which, the bottom one resting on the clay extend almost to the outer edge of the mound; the next smaller and so on for about 20 layers to about 8 feet in height, ending in a very broad, flat, pyramidal form. Is this really artificial?

## POTTAWATOMIE COUNTY.

*Council Bluffs.* Two grooved axes, taken from bluff deposits one eight feet below surface, one twelve feet, both near Council Bluffs. Owned by Dr. Stillman.<sup>138</sup>

Stillman explored the bluff  $1\frac{1}{2}$  miles north of Council Bluffs on the Mynster Springs road where a cut had been made. An opening about three feet across was driven into the bluff to a distance of four feet, and 5 feet below the soil surface. A large fragment of an elk's antlers; a shoulder-blade, fashioned into a rude implement; fragments of bone; a pipe; a piece of deer antler,  $4\frac{1}{2}$  inches long, polished at one end; several flint scrapers; potsherds; a charred corn-cob; several large mussel-shells; many fish-bones; several vertebræ; small bowlders showing fire action; a stone paint mortar of rough red quartzite, were found.<sup>138</sup> This find was on the western face of the bluff, 40 feet above the Missouri bottom, and not far from a lake that touches the foot of the bluff just north of this point. Above the find the bluff rises to a height of one hundred and fifty feet, with a gradual slope to the crest.

South of this point, a half-mile or so nearer the city, is an exposure at a brick yard. It is at the mouth of a hollow or wide ravine, extending back into the hills for some distance. Here, under from 6 to 8 feet of bluff deposit, are ash-heaps of considerable size, with bones, mussel-shells and pottery.<sup>138</sup>

## RINGGOLD COUNTY.

Jordan,<sup>80</sup> in an unsatisfactory article, reports a copper cup found in 1872 by Warner Ruby at Plum Creek, in Knowlton Township; the specimen is now lost. A number of mounds are reported in the neighborhood.——“Knowlton Mound” is described as 500 feet long, 130 feet wide, and 15 feet high; it is said to be serpentine on one side; near the centre black loam nearly 6 feet deep is underlaid by a coarse yellow sand. A skeleton was removed from here some years ago. The question of the entirely artificial character of this mound is raised.——A stone dam, the stones being regularly laid, causing a “ripple,” is mentioned; it might well be natural(?).

## SAC COUNTY.

Negus<sup>104</sup> mentions elliptical and circular mounds which yielded no returns to the investigator near *Sac City*. White<sup>193</sup> examined mounds on the “second bottom” well above the reach of river floods. Eight mounds with no regular arrangement extend north-east and south-west; two of them are oval and six are circular; they vary from 50 feet to 96 feet in diameter, and from 2½ to 3 feet high. No relics were found.

## SCOTT COUNTY.

*Pleasant Valley*.—Ahrman<sup>37</sup> described a curious relic found by him in digging a post-hole on an old village site, of material resembling yellow clay, but hard as stone. Very smoothly carved though rude and incomplete human form; 6 inches long; face distinctly carved, forehead flat, hands resting on chest, lower limbs not carved out.——Near the mouth of *Duck Creek* was a mound with about fifteen interments. Tiffany<sup>178</sup> found two lower jaws and the molar tooth of a bison.

The same explorer opened two mounds at *Gilbert*; one yielded an arrow-head, the other an arrow-head and flint chips.<sup>178</sup>

*East Davenport*.—Churchill<sup>31</sup> reports a group of three mounds on the edge of the bluff overlooking Camp McClellan; three hundred yards from the southern line and thirty yards west of the eastern boundary of the Russell estate in Davenport Township. The mounds are in a north-east and south-west line; they are from thirteen to eighteen yards apart. The eastern one is 15 yards in diameter and 3 feet high; the central and western

SCOTT COUNTY—*Continued.*

ones are about 9 yards in diameter and  $2\frac{1}{2}$  feet high; they are composed of earth, clay, and black soil, and are built upon the original surface; they yielded no remains or relics. Black oaks from 6 to 8 inches in diameter grow over the middle mound.

The shell-beds at East Davenport and on Rock Island, although they have yielded a bone awl, stone axe, hammer-stones, an arrow-head, etc., are believed by Pratt <sup>131</sup> to be natural formations made at times of high water. He, however, makes exception in favor of the one at the lower end of Rock Island, which is eighteen feet above the high-water level, and is irregular in position and thickness. Tiffany has described it; from it came a skull and human bones, as well as the point of an antler similar to specimens from some mounds.

*Davenport.*—A copper implement found in excavation for a gasometer, 400 feet north of the Mississippi River, at a depth of 11 feet, in a small fissure or depression in the Devonian rock. The locality is  $19\frac{1}{2}$  feet above low-water mark. The strata here are 2 feet black soil, 5 feet clay and sand,  $2\frac{1}{2}$  feet pebbles and boulders (this probably continues to the rock). The implement is pointed at both ends, tapering from the middle, and is  $4\frac{3}{4}$  inches long and  $\frac{1}{4}$ -inch in diameter. Much oxydized.<sup>36</sup>

*Near Davenport* (Capt. Hall's place).—Mound opened. Tiffany <sup>178</sup> found a copper axe covered with cloth, a stone pipe, four arrow-heads, one worked bone, and a broken crock; also fragments of obsidian, a lump of yellow ochre, flakes of mica, and parts of two skeletons.<sup>36</sup>

One mile below Davenport, on bank of Mississippi, bearing north-east and south-west (*Cook Farm*) two hundred and fifty feet from high water mark, though but 8 to 12 feet above it. <sup>55</sup>

*No. 1.* *Apparently double on surface*; diameter 30 feet; height 4 or 5 feet. The structure presents a foot of earth; a layer of stones, nicely joined,  $1\frac{1}{2}$  feet; 2 inches of shells; a foot of earth; shells 4 inches; under this, at 5 feet, five skeletons of adults, horizontal, parallel, and near together. Three lay from east to west, with skull of one on shoulder of next; the other two lay headed west. With the last two were a large sea-shell (*Pyrula perversa*) with axis and inner whorls removed; two copper axes, back to back, covered with cloth; one copper awl, a flint arrow-head, two pipes of stone—one frog, one plain.

SCOTT COUNTY—*Continued.*

*No. 2.* One hundred feet south-west of (1); like it externally. Inside, no layers of shells, but several layers of stone, with a few scattered shells; at 5 feet eight skulls and some fragments of bones; these were lying in a semicircle of five feet diameter and each skull was surrounded by a circle of stones the size of a small fist. The bodies had apparently been buried in a sitting position. Two copper axes; two small copper hemispheres; also one of silver; one bear canine; an arrow-head; red pigment; (bones of small snake, intrusive,); two skull fragments.

*No. 3.* One hundred and twenty feet south-west of the last. Largest of series. No layers of shells or stones. At 1½ feet, two adult skeletons, horizontal, covered with oak wood; with glass beads, fire steel, clay pipe, silver ear-ring, femur and tibia injured by some sharp instrument. These intrusive. Beneath them at 6 feet, under thin layer of ashes, bones of two adults and of one young infant, the latter covered with copper beads of several sizes and shapes and dyed deep green, and surrounded by a circle of small red stones arranged like the rays of the sun; five copper axes, all more or less cloth-covered; two stone pipes—one plain and one groundhog; teeth drilled and polished, several bear canines, incisors of gnawers, etc., one beaver incisor, fragment arrow-head; three broken pots with bones of river turtle adhering to inside; two pieces of galena; yellow pigment.

In the second excavation of this mound by Mr. Gass in 1877 two tablets of bituminous slate bearing engraved designs were found. These have caused much bitter discussion. Farquharson<sup>56</sup> carefully described them in an interesting article. Other writers, as Rust<sup>149</sup> and Seyffarth<sup>156</sup> discuss the meaning of the inscriptions they bear. Their authenticity has been questioned by Thomas in various articles, notably in his final report on mound exploration.<sup>221</sup> This is no place for a discussion of the matter, but it is proper to state that the members of the Academy generally have confidence in the genuineness of the specimens. A third tablet, of limestone, bearing curious designs, was found in Mound 11 of the group and has been described by Harrison.<sup>73</sup>

*No. 4.* Two hundred and fifty feet south-west of last; of simple construction. At 6 feet, under a layer of 6 inches of ashes, four adult skeletons lying close together; one copper axe.

SCOTT COUNTY—*Continued.*

"In the earth on which they lay, it could be distinctly seen that they had been enveloped in cloth or some woven material, and at a depth of four feet was a round heap or altar three feet high of stones joined neatly together."

*No. 5.* One hundred feet west of No. 1. In construction like No. 2; several strata of stones with loose shells between them. At 5 feet, parts of two skeletons, above which was a 6-inch layer of hard clay; at same level, three feet north-west, a round heap of stones about 4 feet high. On this lay two very strong thigh-bones and three ribs placed diagonally across each other. Also a few bones leaning against the heap at one side. Stones show fire traces and some are burned, but bones unburned. Some charcoal by these stones. Four or five feet south, confused mass of human bones. Still south 3 feet, under 6 inches of shells, two broken pots, an arrow-head, a stone pipe, and some skeletons. Still south 4 feet, a skeleton lying east and west, and 6 inches above its skull a copper axe. Also animal teeth, incisors of rodents, bear canine, and a *rondelle* 1 inch in diameter.

*No. 6.* One hundred feet south-west of No. 5. Smaller and lower than others; fewer stones, but more shells. At scarcely  $3\frac{1}{2}$  feet depth, perhaps four skeletons. Only one lay with bones in connection. The others had them more or less separated. Two broken pots, a stone pipe, a stone knife, an arrow-head.

*No. 7.* Out of line with rest. Fifty feet west of No. 6. Small. A layer of stones and under it a thin layer of shells;  $3\frac{1}{2}$  feet below latter, much crumbled bones, two pots—one much broken, one nearly entire,—some arrow-heads.

*No. 8.* Somewhat larger and higher than average; two hundred feet west of No. 6. At  $4\frac{1}{2}$  feet (stones, earth, shells,) two skeletons, woman (?) and child; near together; east and west. To right of the adult were two broken pots, eight pieces galena, two small arrow-heads, stones of various sizes and shapes in a jagged or starlike circle; also piece of mica  $6 \times 3\frac{1}{2}$  inches. Over and around all, loam of some decaying stuff, probably a covering.

*No. 9.* One hundred feet north by west from No. 1. Much (3 or 4 feet) reduced by cultivation, etc. Near present surface a few shells and scattered stones. At  $3\frac{1}{2}$  feet two skeletons, horizontal, east to west; much decomposed; skull of western skele-

SCOTT COUNTY—*Continued.*

ton preserved; one-half of lower jaw found three feet distant. Of the other skull only the copper-soaked jaw-bone preserved well, stained by axe. Between bodies, stone pipe; obsidian arrow-point, obsidian flakes, small arrow-points of white chert, near second head; also spoon of river turtle's scapula.

In several mounds broken pottery occurred between surface and deeper part as if pots had been placed on surface of mound.

*No. 10.*<sup>65</sup> Ninety-five feet north-west of No. 1, 100 feet north-east of No. 5. Smallest and least important; 15 feet diameter, 8 inches high. All in this row—7, 5, 10,—are less elevated than the others. At 6 inches depth was a closely-packed pile of stones, about  $3\frac{1}{2}$  feet long east and west,  $2\frac{1}{2}$  feet from north to south,  $2\frac{1}{2}$  feet high. The pile rested on a hard clay bottom, 3 feet from surface of ground. The cavity was about 10 feet long east to west, 6 feet wide, over 2 feet deep, rounded at corners and bottom. In the lowest layer of the pile was a flat stone 2 feet long, 10 inches wide, 2 inches thick, with smoother side downward. Beneath it were fragments of human leg-bones pressed down into the clay. Two to  $2\frac{1}{2}$  feet west of this pile, 1 to  $1\frac{1}{2}$  feet below the surface, a layer of river shells 3 feet long north and south,  $2\frac{1}{2}$  feet wide, 1 inch thick. This layer was arched, the north and south edges being curved downward. Shells badly decayed. Three or four inches below this layer, directly under the middle, several pottery fragments and three small polished stones. The pieces were nicely packed together in a little pile. No other relics or bones.

*No. 11.*<sup>73</sup> Sixty-five feet north of No. 1, twenty-five feet south-west of No. 9, of *slight* elevation. Dark soil and red clay mixed. At 14 inches, large, angular pieces of rock laid closely together, with smaller stones fitting places between,  $2\frac{1}{2} \times 3$  feet; under this a similar layer, etc. At about 3 feet down a flat, unwrought, irregular stone, 14 inches square,  $1\frac{1}{2}$  inches thick, horizontal. It covered a space, in which lay a tablet; cavity a little larger than tablet, and about 5 inches deep. The floor on which the vault stood was of yellow clay, hard and very compact. Tablet head lay east-north-east. Four flint arrows lay on the tablet with points directed inward—one at top, one at bottom, one at each side midway between top and bottom. On upper left hand corner

SCOTT COUNTY—*Continued.*

a *Unio pustulosus* with powdered red ochre. A quartz crystal in centre of tablet over the human figure. Outside of and around the vault were many decayed shells and some small potsherds. No bones.

Tablet, evenly stratified, non fossiliferous limestone; about  $12\frac{1}{2}$  inches long,  $7\frac{1}{2}$  wide,  $1\frac{1}{2}$  thick. Under side a natural cleavage. Upper side somewhat smoothed. An uncouth human figure, astride a circle. Over his head a copper axe; above this at corners are bird-pipes, with eyes of quartz set in with some white cement. Several characters, some like those on other tablets. All these are incised; lines in small figures are  $\frac{1}{16}$  inch in depth; in large, 3 or 4 times as deep, wide and coarse. Colored deep, bright ochre red. Shows signs of heat, etc.

*Allen Farm Group.* Situated six miles down the river from Davenport, on the extreme edge of the bluff at a half mile from the river; the mounds are in a curve, following the bluff, with a general trend north-east and south-west. They are overgrown with brush. They are from one hundred to one hundred and fifty feet apart and range from 2 feet to  $5\frac{1}{2}$  feet in height. They are described by Pratt in three articles, <sup>130, 218, 219.</sup> and are numbered from the east end.

*No. 1.* Bones had been found herein previously.——Pratt describes the later exploration. The mound was 30 feet in diameter and 3 feet high. It yielded eight skulls and many bones; all were badly decomposed and were scattered except some long bones which were laid side by side; at about 2 feet depth were a number of large, flat, rough slabs of limestone, irregularly placed; six flint implements were found, some of them immediately below the long bones mentioned above; at three feet from the centre were a quantity of pottery fragments and near them a lot of charred human bones.

*No. 2.* At 4 feet down were four badly decayed and broken skulls, with other bones; no ribs or vertebræ were found and probably but parts of the bodies were buried here; the heads are west; a poor discoidal stone, two fragments of stone implements and two small beads of thin copper were obtained; there was no evidence of fire in the mound.

*No. 3.* Nearly circular; 30 to 40 feet in diameter and  $2\frac{1}{2}$  feet high; some arrow-heads are said to have been found.

SCOTT COUNTY—*Continued.*

*No. 4.* Originally 4 feet or 5 feet high, this had long been removed; bones of three skeletons, and a sea-shell were found.

*No. 5.* Had been removed to make room for a house. Remains of several skeletons, including one or two good shells, were found; one of these is broad at base, "gothic formed," and has had several *rondelles* cut from it on each side.

*No. 6.* Removed in part for a croquet ground; parts of several skeletons and two rather light, well-burned earthen jars.—What was left of it was examined. It was of mixed clay and black earth, with a few small gravel stones, two or three flint flakes and a piece of limestone. This last is a rough fragment about 10 inches long, 3 inches wide and  $1\frac{1}{2}$  inches thick; it was near the south end of the mound, upright, with its upper rather pointed end about a foot and a half below the sod. Under 4 feet of the mixed earth the undisturbed yellow clay was met; this was the bottom of an excavation made to  $\frac{1}{2}$ -foot below the natural surface; it was basin-shaped and from 6 feet to 8 feet across, being largest from north to south. Part of the body of a human cervical vertebræ was found in the mound; also a well made plain red and gray catlinite pipe, an oval stone about  $1\frac{3}{4}$  inches by  $1\frac{1}{2}$  inches and 1 inch thick, and a potsherd. These were all at about 3 feet down.

Two mounds in *Rockingham* examined by Tiffany<sup>178</sup> contained decomposing skeletons to the number of about a dozen in each.—In a mound in the same locality, already somewhat excavated, he found a small wheel like a pulley made of burnt clay and pounded shells, a red pipestone pipe, three sea-shells—*Cassis madagascarensis*. The bones found here were badly decomposed.

A low,  $\frac{1}{2}$ -foot high, mound on the Heidt farm below Rockingham; it is alongside the River Road. The elevation consists chiefly of stone; under there is the usual mixed earth; a few poorly preserved bones and two flint arrow-heads were found.<sup>37</sup>

*Staffelbach's Farm*, seven miles below the city of Davenport; three-eighths of a mile from the river. A mound on crest of a spur bearing south of west from main bluff here prominent as Eagle Point. Mound about 25 feet long, 2 feet high. Surface of black soil for 6 to 12 inches; next a burnt indurated clay, in

SCOTT COUNTY—*Continued.*

color and texture like medium-burnt brick for 30 inches. Then charred human remains 6 to 18 inches. Then undisturbed loess, imbedded in which a very few decomposed, unburnt bones. No implements of any kind.

Considered by Tiffany a cremation furnace.<sup>36</sup>

*Cleona Township.* Gass<sup>66, 67</sup> describes engraved stones imbedded in a creek twenty-two miles west of Davenport. Five in all; two were brought to the Academy. The others were removed later. The very large one left is not particularly important.

(a). Very dark colored, hard, heavy, coarse greenstone. Irregular; it bears a human head, a quadruped, a bird, a human form, parts of human face and form, some unrecognizable marks.

(b). Same material; almost regular oval form; twice the size of a man's head. Cut in sharp grooves is a human face.

(c). Same material; smaller; a few scratches or irregular lines.

(d). Weighs 100 pounds or more. Very hard, light-colored quartzite; an uncouth human head on one side, a rude tree on the other.

There are mounds near by. A copper implement was found among the stones two years earlier.

In the various articles regarding Scott County mounds published in the Proceedings of the Academy are figures showing construction and arrangement. These cuts have been loaned to other authors and some have not been returned. As the full series can not be published here all are withheld. (F. S.)

## NOTES UPON SCOTT COUNTY SPECIMENS.

*Physical Anthropology.*—The bones from the Cook Farm Mounds were usually too badly decomposed for preservation. From Mound 2 were removed two fragments of skulls—only frontal bones, with nasal bones attached. Farquharson<sup>55</sup> says these indicate a highly-arched nose. From No. 9 came a skull fairly preserved. It gave the following measurements: Horizontal circumference, 19.5; long diameter, 7; transverse diameter, 5.25; capacity, cubic inches, 76.2; distance of *foramen magnum*, 1.8; ratio of distance, 0.269; ratio of diameters, 0.752.

SCOTT COUNTY—*Continued.*

*Objects of Copper.*—The axes are of three shapes—with flat sides, plano-convex, double-convex. All are simply hammered from native copper.

No.	Mound.	Weight, lbs.	Shape.	Length.	Width.		Thick.
					a.	b.	
1	C. No. 3	1.0721	(a)	6 $\frac{7}{8}$	2 $\frac{1}{8}$	1	$\frac{1}{2}$
2	C. No. 3	1.1564	(a)	7 $\frac{1}{2}$	2 $\frac{3}{8}$	1 $\frac{1}{8}$	$\frac{3}{8}$
3	C. No. 3	0.5387	(b)	4 $\frac{5}{8}$	2 $\frac{3}{8}$	1 $\frac{3}{8}$	$\frac{1}{2}$
4	C. No. 3	0.1056	(b)	5 $\frac{3}{4}$	2 $\frac{3}{4}$	1 $\frac{1}{2}$	$\frac{3}{8}$
5	C. No. 3	0.9961	(b)	5 $\frac{1}{4}$	2 $\frac{5}{8}$	1 $\frac{5}{8}$	$\frac{1}{2}$
6	C. No. 1	0.4242	(b)	3 $\frac{3}{4}$	2 $\frac{1}{8}$	1 $\frac{3}{8}$	$\frac{3}{8}$
7	C. No. 4	0.8114	(a)	5 $\frac{5}{8}$	3	1 $\frac{7}{8}$	$\frac{1}{4}$
8	C. No. 1	0.4602	(b)	3 $\frac{5}{8}$	2 $\frac{1}{4}$	1 $\frac{1}{2}$	$\frac{5}{8}$
9	C. No. 2	0.8464	(a)	6 $\frac{1}{4}$	2 $\frac{3}{4}$	1 $\frac{1}{4}$	$\frac{1}{4}$
10	C. No. 2	0.5085	(b)	3 $\frac{1}{2}$	2 $\frac{1}{4}$	1 $\frac{3}{8}$	$\frac{3}{8}$
11	C. No. 5	1.6575	(b)	6	3 $\frac{1}{4}$	1 $\frac{7}{8}$	$\frac{7}{8}$
12	C. No. 9	0.8743	(a)	5	2 $\frac{3}{8}$	1 $\frac{3}{4}$	$\frac{1}{4}$
13	Princeton.	0.4987	(b)	4	2	1	$\frac{4}{16}$
14	Toolesboro.	0.8171	(a)	5 $\frac{1}{4}$	2 $\frac{5}{8}$	1 $\frac{1}{4}$	$\frac{1}{8}$
15	Toolesboro.	1.7700	(a)	5 $\frac{1}{2}$	2 $\frac{1}{2}$	1 $\frac{3}{8}$	$\frac{5}{8}$
16	Toolesboro.	1.6314	(b)	6 $\frac{7}{8}$	3	1 $\frac{1}{2}$	$\frac{5}{8}$
17	Toolesboro.	0.5143	(b)	4	2 $\frac{1}{4}$	1 $\frac{1}{4}$	$\frac{1}{8}$
18	Toolesboro.	0.2143	(b)	3 $\frac{1}{2}$	1 $\frac{7}{8}$	1	$\frac{1}{4}$
19	Toolesboro.	2.4985	(c)	5 $\frac{3}{4}$	1 $\frac{3}{8}$	1 $\frac{5}{8}$	$\frac{1}{8}$
20	Toolesboro.	0.9257	(a)	4 $\frac{3}{4}$	2 $\frac{1}{2}$	1 $\frac{1}{2}$	$\frac{3}{8}$

Nos. 1, 2, 3, 4, 5, 12, 14, 16, 19, and 20 are more or less covered with cloth; 6 and 8 found together, were also cloth-covered, but were scraped on finding.

Eleven copper awls were found in mounds (with one exception). They are of ordinary types but some are bent at extremities.

Thin copper hemispheres; one, 0.8 inch diameter, weighs 34 grains; the other, 0.5 inch diameter, weighs 10 grains. With them was found a silver hemisphere 0.7 inch diameter and weighing 13 $\frac{1}{2}$  grains. (These came from the Cook Farm Mounds—No. 2.)

A curious copper implement was found partly washed out from the Cook Farm Group—No. 3. It was produced by hammering

SCOTT COUNTY—*Continued.*

—apparently out of an already hammered bar. It is rudely spoon-shaped and weighs 86 grains; the total length is 82 mm.; length of blade, 22 mm.; breadth of handle, 8 mm.; breadth of spoon at widest, 14 mm.; average thickness of handle, 2 mm.; thickness of spoon part, 1 mm.; thickness of middle part of spoon,  $\frac{1}{2}$  mm. A spot of silver occurs on one side.

The copper beads are of thin beaten strips of copper rolled up into tubes varying in size and width.

*Pottery.*—Holmes <sup>78</sup> speaks in general of Northern Mississippi ware—dark paste, sand tempered (often granitic), rough fracture, rude finish. Shapes are comparatively simple, often long, tapering below, flat-bottomed. Ornamentation of cord impressions, incised lines, and implement indentations. He also describes the same Davenport specimens as Farquharson. (See <sup>55</sup>.)

*Ring;* color almost black; fracture, dark gray; specks of shell in the paste. Well baked. The greatest diameter is  $1\frac{1}{4}$  inches. thickness at the margin,  $\frac{3}{4}$ -inch; diameter of central aperture,  $\frac{5}{8}$ -inch; thickness at edge of aperture,  $\frac{1}{2}$ -inch; depth of groove about edge,  $\frac{1}{8}$ -inch; width of groove,  $\frac{3}{4}$ -inch. From the groove, eight small holes pass to central aperture of pottery.

From the *Cook Farm* Pratt <sup>132</sup> describes a curious object:—Natural sandstone concretion, firmly attached and almost central upon a flat, thin base-piece of light brown flint. Resembles an animal with broad, flat snout. Lower part *carved* into a tail and limbs. Eyes of bits of quartz crystal set with some kind of cement. Flint base much worn.

*Rondelles* and post-mortem trepanation.

(a). *Rondelle* cut from squamous portion of the temporal bone. Found in *debris* of mound near Davenport (Cook Farm). Circular; an inch in diameter.

(b). Part of cranial vault from which seven circular pieces had been cut. Found in mound on Pine Tree Creek, Muscatine County, and alone occupied the base of the mound.

(c). Skull from which three *rondelles* had been cut. Found on Allen Farm, near Davenport, at the base of the largest mound in the group. (Farquharson.<sup>54</sup>)

*Elephant Pipe.*—Farquharson <sup>53</sup> describes No. 1 with care:—Soft fragile sandstone; with dark external polish; weight, 164

SCOTT COUNTY—*Continued.*

grammes; extreme length (of head) 88 mm; height at shoulders, 39; girth, 85; thickness at shoulders, 24; circumference of trunk at extremity of lower tip, 33; length of trunk from tip to angle at mouth, 35; tail length, 29. The animal is represented with feet together, trunk coiled and resting on ground.

*Mound-builders' Cloth.*<sup>37</sup>—Each cord of the warp is composed of two double and twisted cords, and the woof of one, which passes between the two parts of the warp, the latter being twisted at each change, allowing the cord to be brought close together so as to cover the woof almost completely.

Holmes<sup>212</sup> also gives a cut of a cloth impression from a pottery fragment from Iowa. One series of strands appears to be quite rigid while the other has been pliable and appears in the impression only where they cross the rigid series.

*Tablets.*—Lack of space forbids any details regarding the tablets here. A careful study of them will be published in time.

## TAMA COUNTY.

Beal and Loos<sup>18</sup> explored a mound three miles west of *Toledo*. Many bones and flint arrow-heads were found; the bones lay without arrangement; one skull had an arrow-head imbedded in it. The bones were all thick and heavy—particularly the small bones.

## TAYLOR COUNTY.

Proudfit<sup>138</sup> mentions "a large grooved celt of unique design" from this county.

## VAN BUREN COUNTY.

A group of mounds located upon a sharp ridge overlooks the town of *Doud*, near the Des Moines River, in the north-west township of the County.<sup>174, 193</sup>

Thomas further describes these in his final report.<sup>221</sup> There are eighteen mounds, circular in form and placed in a nearly straight line on the very crest of a sharp ridge.

*No. 1* was 25 feet in diameter and 5 feet high; it yielded two gray disks each 4 inches in diameter, a grooved axe, and flint chips.

*No. 7* was 20 feet in diameter and 3½ feet high; it had a central core of hard earth.

*No. 12*, with a diameter of 25 feet and a height of 4 feet, con-

VAN BUREN COUNTY—*Continued.*

tained, under the hard core and at depth of original surface, decayed human bones and three fragments of dark-colored pottery.

No. 14 yielded nothing.

No. 15, of same size as No. 12, contained scarcely more than traces of a skeleton which lay with head north, beneath a very hard core.

Negus<sup>104</sup> refers to mounds near *Kilbourne*. Two opened yielded human bones; the mounds were 130 feet in circumference and 6 feet high.

From far above Pittsburg to a point several miles below Keosauqua, according to Evans,<sup>48</sup> a continuous chain of works is to be seen.

The Dahlbergs<sup>35</sup> describe pottery found near the mouth of Chequest Creek at *Pittsburg*, on the Des Moines River; the paste was composed of clay and sand mixed with small pebbles; the pottery was hard, firm and durable; vessels of at least 18 inches diameter at the mouth appear to have been represented among the fragments; rude ornamentation of nodes and incised lines; some edges were crimped.——They also mention a bed of ashes and charcoal 3 inches thick and 2 feet from the surface, in the river bank.

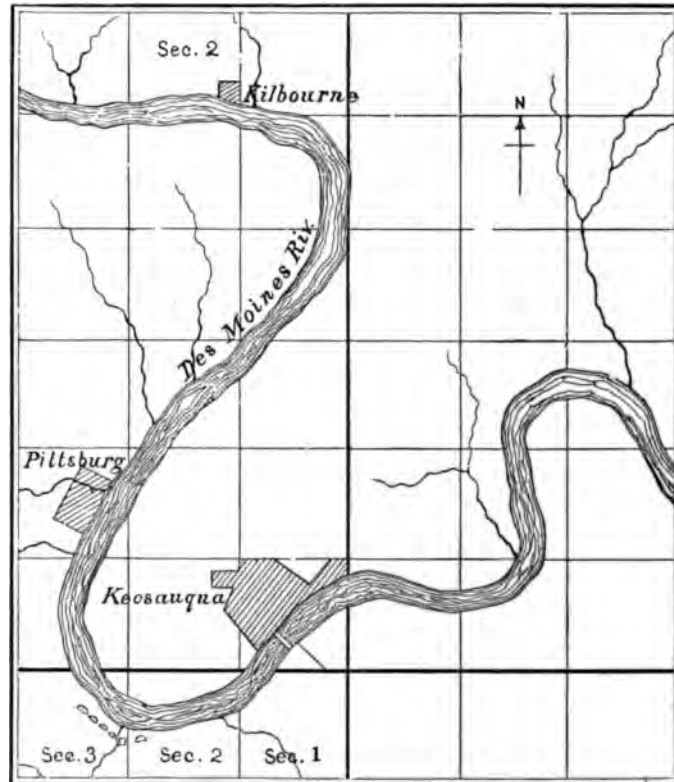
Evans<sup>44</sup> describes mounds between Pittsburg and *Keosauqua*. Thus in *N.-E. ¼ S.E. ¼ Sec. 3* (see map) is a mound on a bluff point, two hundred feet from the water's edge, and one hundred feet above the stream. In it, at 2 feet down, was found a human skeleton, except the lower jaw and leg-bones, with potsherds; the head of the skeleton was toward the south-east; the skull was somewhat Neanderthaloid.——Fifteen rods north 55° west from last, was a half-moon-shaped mound, about two hundred feet from the water's edge; thigh-bones were found in it.——Fifteen rods north 45° west from last was a mound, which yielded only a small fragment of pottery.

In the *N.-W. ¼ S.-W. ¼ Sec. 2*, (see map) at thirty rods south 45° east from the mouth of Ely's Creek, one hundred feet above the water and twenty rods from its edge, was a mound 60 feet in diameter and 5 feet 6 inches high. At 5 feet down was a thigh-bone; an upper arm-bone and fresh-water shells were also found.

White<sup>195, 196</sup> and Evans<sup>44</sup> describe the shell heap at *Keosauqua*,

VAN BUREN COUNTY—*Continued.*

on the Des Moines River, twenty rods north  $55^{\circ}$  west from the mouth of Ely's Creek; it is forty feet from the river's edge and twenty feet above its bed. About 4 feet in thickness, of silt-like material derived from floods, is crowded with *Unios* of a dozen species; bones of deer are common, and the long bones are split open for marrow; bones of bear, wolf, dog, and snapping-turtle



are also found. Flint flakes, arrow-heads, a greenstone axe and pottery fragments were found; the pottery is of common clay with sand tempering and is poorly burned; its ornamentation is simple, of lines or cord markings; pieces of limestone laid together show evidence of fire action.

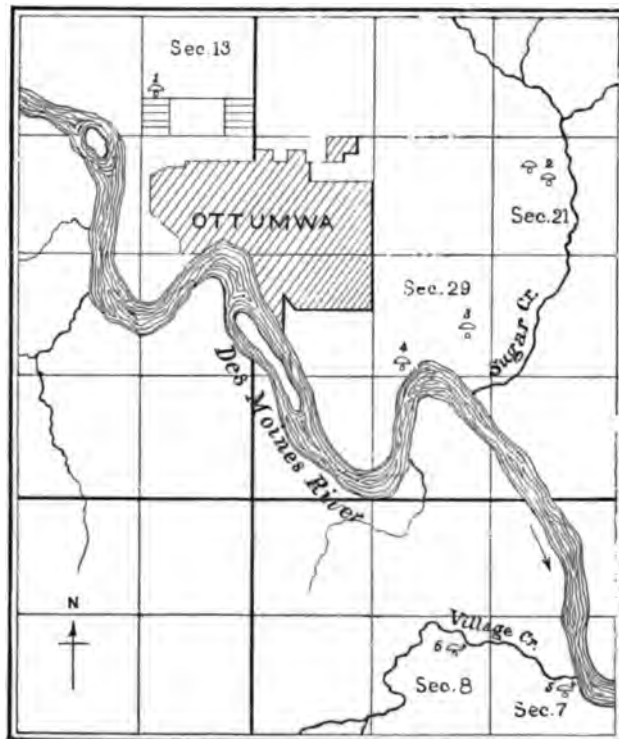
Wilson <sup>198</sup> reports five rude chipped implements from a depth of 2 to 5 feet in a clay soil, from near *Bonaparte*.

## WAPELLO COUNTY.

Negus<sup>104, 105</sup> gives some indefinite statements regarding mounds in this county and Fulton<sup>59</sup> refers to some fully described by Evans. Ketterman<sup>162</sup> states that a line of mounds runs from north to south through the county and mentions those in *Trap. 72, R. 13 W.*—The only serious work is that of Evans.<sup>44-48</sup>

Near *Ottumwa*—to the north (see map) on the Hederick Farm—is a group of mounds. Two are prominent; one is 50 feet in diameter. No relics were secured except a few chips of flint.

Sugar Creek Mounds (see map). Two were examined.



*No. 1.* On the highest point about; overlooks the next one and the Trawell Group. In circumference 150 feet, it has a diameter of 50 feet and a height of  $3\frac{1}{2}$ . It yielded bits of charcoal and decomposed ashes.

WAPELLO COUNTY—*Continued.*

No. 2 was 180 feet in circumference, 60 feet in diameter; it yielded a few bones but no relics. East of No. 1 and one-fourth mile away are the remains of an old hearth, near which a number of arrow-heads were found.

Trawell Group (see map). Consists of three mounds of same size and appearance as the last. From one was taken a small hatchet of greenstone.

Stiles Group (see map). Yielded a few broken arrow-heads, a small greenstone hatchet, and some bits of obsidian.

Village Creek Groups (see map). There are seven or eight mounds in each of the two groups; the eastern group is on a high ridge; the mounds are about 150 feet in circumference and 4 feet high; they are about one hundred and fifty feet apart. Structure as shown in them is: 1 foot earth; 2 inches of ashes, charcoal, and calcined bones; two other ash-layers at about 1 foot intervals; these ash-layers extend to the very edge of the mound.—— Similar evidences of fire action are found in the western group.

*Cliffland.* Six miles from Ottumwa, on a high site in view of the Village Creek Groups and on the opposite side of the river from them, are three mounds, about forty rods apart and ranging east and west; the easternmost is much like the Village Creek mounds, consisting of clay and ashes; it is 50 feet in diameter and nearly 4 feet high; in it were several small pieces of magnesian limestone, yellow and red sandstone, and a few bits of flint, all showing signs of having been heated. No bones were found, but a gray pulpy mass may be traces of them.

Near *Eldon*, in Washington township, one and a half mile east of the village, on level river bottom land are three east and west lines of mounds. There are five in each range; the ranges are about eighty yards apart; the mounds measure from 10 to 50 feet in diameter and from 1½ to 2½ feet high. They consist of loose sand and mould and are supposed to be fairly recent graves of Omaha Indians.

Thomas describes this region <sup>221</sup> and assigns a group of mounds south of Eldon to the Iowas and a group further south, and just north of Iowaville, to the Pottawatomies. Black Hawk's grave is with the former group. Near it also are three hard worn parallel tracks nearly a mile long—a race-course.

## WARREN COUNTY.

Morgan <sup>174, 214</sup> mentions a mound in this county which contained a great number of skeletons.

## WEBSTER COUNTY.

Aldrich <sup>1</sup> mentions several mounds on the Des Moines River, six or eight miles above Ft. Dodge. In one an arched structure was found.

*Ft. Dodge.*—Fulton <sup>59</sup> mentions at this locality mounds and an embankment, with gateways and openings, enclosing many acres. Williams <sup>197</sup> mentions excavations which yielded parts of thigh-bones, imperfect skulls, teeth, coals, pieces of burned wood, etc. He inclines to the belief that they are house sites.

The latter author also mentions mounds at forks of Boone River.

## WOODBURY COUNTY.

Fulton <sup>59</sup> states that a mound in this county, measuring 65 feet by 100 feet, contained seventeen skeletons, one sitting, the rest lying feet to feet in two rows; at the head of the rows was an earthen vessel.——Skeletons and relics were found in a mound at Sioux City.<sup>207</sup>

## WRIGHT COUNTY.

One mile north-east of *Clarion* were twenty pits in an elliptical form, within an area of one acre; the pits were 3 feet by 10 feet and from 2 to 3 feet deep and were spaced; an opening occurred in their arrangement on the south-east; many animal bones were found. (Fulton. <sup>59</sup>)

## A LIST OF COLEOPTERA FROM THE SOUTHERN SHORE OF LAKE SUPERIOR.

With Remarks on Geographical Distribution.

BY H. F. WICKHAM, M. S.

SINCE the publication in 1850 of Dr. Leconte's "General Remarks on the Coleoptera" in Agassiz's "Lake Superior," a good deal of attention has been bestowed upon the beetles of that region, partially because of the considerable number of new species brought to light by the explorations preceding the bringing out of the report, and perhaps more by the early-recognized fact that a number of the forms taken in the district have a wide Northern and Alpine distribution. In 1878 Messrs. Hubbard and Schwarz brought out their "List of Coleoptera Found in the Lake Superior Region," which contains the results of long-continued and careful collecting by the authors, with the addition of all the species taken by Dr. Leconte in his previous explorations. Over twelve hundred names are given of Coleoptera from various points on both shores of the lake and from some of the larger islands. Several short reports were afterwards published by Dr. Leconte, which contain lists of species taken by members of the Geological Survey of Canada, but only a few are additional to those enumerated in the Hubbard and Schwarz List.

My own collections were all made at Bayfield, Wisconsin, on the southern shore of the lake, and about sixty miles from the western end. Most of the work leading to the preparation of the lists mentioned in the preceding paragraph had been done far to the eastward, and to this fact may be due the large number of names—over 200—contained in my list and wanting in the others. About 500 of those I enumerate had already been found at some point in this basin.

Bayfield lies in a lumbering district and is surrounded by heavy forests of coniferous trees with their usual concomitants of underbrush, the whole making a closely-packed mass of vegetation almost impenetrable and so dense as to preclude the use of the beating or sweep-net

except in partially-cleared openings or along wood-roads. The face of the country is extremely rough, bold rocky hills alternating with deep ravines, most of which form the course of some small stream, or, failing this, there may be a series of small cold pools with boggy spots between. The lake shore is in most places bordered by high bluffs, but two or three fine beaches are within easy reach, and with the marshes lying back of them furnished quite a number of forms not found elsewhere in the vicinity. A peat-bog of several acres in extent also proved very productive of peculiar species. Very little farming has been carried on, and consequently we find few introduced species, so that almost the entire number of those enumerated may be considered indigenous.

The period covered by my collections is that between the middle of June and the end of July. This will account for certain deficiencies in the list which will be evident to every one who is familiar with the Spring fauna of our Northern States. Thus the poor showing in the Staphylinidæ, Pselaphidæ, and Scydmaenidæ may be partially explained. The Carabidæ are tolerably well represented, but the curious absence of any species of the genus *Brachinus* is worthy of note, since a number of them are found in the Canadian provinces to the eastward. There is a good representation of the genus *Platynus* (as usual in our northern regions) and of *Harpalus*, while the Scaritini are but poorly developed, only three species of one genus (*Dyschirius*) appearing on the list. The Water Beetles were not found in such abundance as I had hoped from a perusal of lists from northern localities, and of those named in the present report a great part were taken not in water but under moss in damp spots—a peculiarity which I have noted in some species of *Agabus* collected on a previous trip to Alaska. Seining was very unproductive, but a good many things were washed up by the lake on stormy days, and might be picked up along the beach, some of them alive, others apparently drowned by the buffeting of the surf. Staphylinidæ were not given quite as much attention as some other families, and as the North American Aleocharini are for the most part undescribed, but few of them appear in the list. The absence of *Bledius* is of interest, and is to be noted as a companion incident to the dearth of Scaritini, mentioned above. Most of the small Silphidæ were taken in slime-moulds of the genus *Stemonitis*, though *Agathidium* may be taken on various fungi or in rotten wood penetrated by the mycelia. In the Coccinellidæ the occurrence of *Hyperaspis quadrivittata* is very interesting, as it is more essentially southern

in distribution. Only one specimen was obtained, and this may possibly have been blown from some vessel bearing freight from a southern port. The genus *Dermestes* was not met with, though traps for carrion beetles were quite productive of other kinds. *Saprinus lugens* has been found to extend its range into the Lake Superior basin, and the occurrence of *Cyllodes biplagiatus* in numbers may be worthy of note. Of the Elateridæ it is a pleasure to record the capture of a fine specimen of *Megapenthes rogersii*, a rare insect recorded hitherto only from Canada, while the fine development attained by the genus *Corymbites* should receive attention. But few Scarabæidæ were seen, only one of which, *Aphodius hamatus*, seems worthy of special remark, from its habit of living in the rotting vegetable mould of swamps rather than in animal excrement, as usual with this genus. The Cerambycidæ form nearly a tenth of the whole list; their great abundance may be directly traced to the forest-covered condition of the district, and the genera and species are, in the main, such as follow in their distribution that of the coniferous forests of the north. The Lepturini are especially noticeable, almost every umbelliferous flower-head having its specimens feeding, while sumach and certain Rosaceæ were also favorite haunts. Certain species seem to prefer certain flowers—for example, *Gaurotes cyanipennis* was found almost exclusively on sumach blossoms. Many Longhorns, that were not otherwise met with, were cast up alive by the waves, among them the rare *Monohammus marmorator*. Chrysomelidæ are rather few in species, and ordinarily in individuals as well, the occurrence of *Gonioctena pallida* is quite characteristic of the boreal element in the fauna. *Anthicus pallens* is a curious form, with a coloration resembling that of some sea-coast Anthicidæ; it is found under logs in the fine white dry sand of the beaches, and is interesting because of its being found on the sea-beaches of Florida and New Jersey as well. In looking over the list of Rhynchophora perhaps the most striking feature lies in the entire absence of the group Barini.

A perusal of the list of beetles which follows will show that the majority of them extend to the north and east into the Canadian provinces of Ontario and Quebec, since it is, in almost every case, from these parts of the Dominion that the records which are designated in my notes as Canadian, have come. The Michigan records are mostly taken from Hubbard, and refer chiefly to the lower peninsula, especially the region about Detroit. Those from Colorado are almost entirely confined to altitudes of above 6,000 feet, and are

drawn from lists of various writers, chiefly Schwarz, Bowditch, Putnam, Packard, and Cockerell, while the New Jersey ones come from the list of Smith. Dr. Hamilton has lately printed valuable compiled catalogues of Alaskan and circumpolar Coleoptera, which have been used freely and proved very helpful. In addition to the above, all the extensive faunal lists published in this country have been gone over, as well as most of the smaller ones, and nearly all of the monographic or synoptic works of systematists. It is, therefore, hoped that with the addition of many hitherto unpublished data derived from my own collection, a fair idea may be had of the distribution in this country of the species mentioned in this report. It is, however, a most unfortunate fact that there are immense stretches of country, even in thickly-settled districts, from which we have literally no information except shreds scattered through descriptive papers, and every collection of any size must, without doubt, hold much that is new to us in the way of distributional data.

The time for an accurate map of the faunal regions of the continent has not yet come—nor will it before another century at least of careful investigation has enabled us to fix approximately the range of the rarer forms of insect life. It is evident to any one who will read with care and with some understanding of the general principles of distribution, that many of the recent theories as to the division of our country into "life-zones" have very little foundation in fact. If better proof were wanting of this, we might point to that of authors changing from year to year their arbitrary arrangement of our zoö-geographical regions—uniting to-day two or three of those of older authors, and separating them again a few months later on. All this may or may not be progress, but it will all have to be gone over again in the light of a wider knowledge than seems to be at present in the possession of certain writers who cannot rest without having first shown us that all previously conceived ideas are totally wrong, and that their explanation of the distribution of life is the only plausible one. A single group of animals may or may not indicate in a general way the lines of distribution followed by a larger number—but it is manifestly unreasonable to hope for a stable method of division of a country into life-zones before the life of that country is well known.

Local lists must form the basis of our work in this line for a long time to come, and in this direction the present report is offered and must here find its only value. For the sake of facilitating a comprehension of the affinities of the Bayfield fauna to certain others I have

made a few comparisons in tabular form which will show the number of genera and species common to their lists. Others might be made with profit, but these are sufficient to show that there is much less of a North-Pacific element in certain parts of the Lake region than might be supposed from a glance at bio-geographical maps, while a very large percentage of forms extend south-east and south. It will be noted that fewer species are common to the Bayfield list and that of Alaska than to Bayfield and Europe. The lists I have used in making the table are as follows. Each has approximately the number of species set opposite the name.

New Jersey, John B. Smith.....	2,068
Michigan, lower pen., Henry G. Hubbard and E. A. Schwarz.....	1,775
Alaska, compiled list, John Hamilton.....	547
Europe and Asia, compiled list, John Hamilton.....	594
Rocky Mountains, E. A. Schwarz.....	659
Canada (Ont. and Queb.), list issued by the Ent. Soc. of Ontario, with additions chiefly by Harrington and Kilman....	2,500
Iowa, lists of Osborn and of my own, with additions from my unpublished records.....	1,425

I have selected the list of Mr. Schwarz as being the largest of any of those from the Rocky Mountains, and being approximately of the same extent as my Bayfield catalogue. Of course if a compiled list were used which should include all the known forms from the mountains the number common to the two places would be much increased.

TABLE OF BEETLES.

COMMON TO BAYFIELD AND	SPECIES.	GENERA.
New Jersey.....	436	352
Michigan (Lower Peninsula)...	447	343
Alaska.....	71	139
Europe and Asia.....	92	...
Rocky Mountains (Schwarz list)	106	187
Canada (Ontario and Quebec)...	563	374
Iowa.....	335	303

No claim can be made that this table shows the exact relations of the fauna—the difference in size between the lists precludes even the possibility—but it gives at a glance what is not quite so evident in reading over the following record of the species taken at Bayfield. I have marked with an asterisk those that are not in the Hubbard and

Schwarz catalogue. It is with pleasure that I have to acknowledge the kind assistance of Dr. George H. Horn in making comparisons of specimens in difficult genera with those in his own collection. The identifications of all the species of *Hydroporus*, *Agabus*, and *Amara*, as well as most of those of *Harpalus*, are from him. Mr. Hayward has named the *Bembidia*, while Captain Casey furnished names of two or three Staphylinidæ and of *Anthicus*. The heavy task of looking over the literature of the subject for records has been shared and materially lightened by the ever ready help of my wife.

### LIST OF SPECIES.

#### CICINDELIDÆ.

- Cicindela longilabris* Say. Can., Alaska (Yukon River), Hud. Bay Terr., Nova Scotia, Wis., Colo., Nebr., Mich., Utah, Mon., Cal., Oregon; the last four localities are for the green form. Mt. Washington, N. H. ✓
- Cicindela 6-guttata* var. *patruela* Dej. Colo., N. Y., N. J., Pa., Md.; the other varieties occur in the Eastern U. S. generally, especially northward, and as far west as Nebr.
- Cicindela purpurea* et var. *limbalis* Klug.\* Nev., Colo., New Mex., Iowa, N. Y., N. J., Ohio, Ky., Kans. In its many forms, *purpurea* is quite generally distributed in the U. S. and Canada.
- Cicindela vulgaris* Say. Kans., Nebr., Can., Mt. Wash., N. H., Iowa, Ohio, Vt., N. Y., Wyo., Nova Scotia, N. J., New Mex., Cal., Oreg., B. C., Md., Ky., and "in almost every part of the U. S." (Schaupp.)
- Cicindela repanda* Dej., et var. *12-guttata* Dej. Can., Mt. Wash., N. H., Iowa, Col., Mich., Ohio, Vt., N. Y., Wyo., Nova Scotia, N. J., Atlantic to Pacific, Hudson's Bay to New Mex. and Ariz.
- Cicindela hirticollis* Say. New Mex., Ariz., Cal., Kans., Nebr., Can., Iowa, Mich., Vt., N. Y., Fla., N. J., Tex.

#### CARABIDÆ.

- Omophron americanum* Dej. Kans., Nebr., Can., Iowa, Colo., (L V.,) Mich., Ohio, N. Y., N. J., New Mex., Va.
- Omophron tessellatum* Say. Can., Iowa, Ohio, N. Y., N. J., Atlantic Region in general.

- Cychrus nitidicollis** Chevr.\* (var. near *brevoorti* Lec.) Can. and Maine. The other forms occur from "Hudson's Bay to Northern Virginia."
- Cychrus lecontei** Dej. Can., Iowa, Mich., Ohio, Vt., N. Y., Nova Scotia, N. J. This is considered one of the forms of *stenostomus* which has a range from "Can. and Mich. to N. C."
- Nomaretus bilobus** Say. Iowa, N. Y., Mo., Ohio.
- Calosoma frigidum** Kirby. Can., Mt. Wash., N. H., Mich., N. Y., Indiana.
- Calosoma calidum** Fabr. Colo., Iowa, Kans., Nebr., Can., Mich., Ohio, Vt., N. Y., Nova Scotia, N. J., Mont., New Mex., "U. S. in general."
- Elaphrus clairvillei** Kirby. Can., Iowa, Mich., N. Y.
- Elaphrus ruscarius** Say. Can., Iowa, Mich., Ohio, N. Y., Nova Scotia, N. J., Colo.
- Blethisa quadricollis** Hald. Can., N. J., Ill.
- Loricera cærulescens** Linn. Can., Alaska, Cal., Mich., Nova Scotia, "Northern U. S. and Europe."
- Notiophilus æneus** Hbst. Can., Iowa, Mich., N. J., "Northern U. S."
- Notiophilus hardyi** Putz.\* Can., Colo. (9,400–13,000 ft.), Mich., Ohio, Newfoundland, N. Y., Idaho, Mont.
- Nebria pallipes** Say. Can., Mt. Wash., N. H., Iowa, Mich., N. Y., N. J., Pa., Va.
- Dyschirius æneolus** Lec. Iowa, Colo. (G., A.), Mich., Can., Cal., B. C.
- Dyschirius globulosus** Say. Can., Iowa, Ohio, N. Y., Fla., N. J., Idaho, New Mex.
- Dyschirius setosus** Lec. Can., Mich., N. Y., Mass., Pa.
- Nomius pygmæus** Dej. Can., N. Y., Ga. to Cal., Ala., N. C., Colo., Wash., (Hamilton). Also in Europe.
- Bembidium carinula** Chaud. Can., Colo. (8,000 ft.), N. Y.
- Bembidium coxendix** var. *nitidulum* Dej.\* Can., Iowa, Ohio, Vt., Colo., N. J.
- Bembidium concolor** Kirby. Can., N. Y.
- Bembidium chalceum** Dej. Can., Iowa, Mich., Ohio, N. Y., N. J.

**Bembidium nitidum** Kirby. Kans., Nebr., B. C., Custer County, Colo., Vt., N. Y., N. J.

> **Bembidium transversale** Dej. Can., Colo., Mich.

**Bembidium** sp. aff. *variegatum* Say.

**Bembidium flavopictum** Mots.\* Alaska, So. Cal., Baja Cal., Arizona. Region west of Miss. River generally. Can., B. C., Iowa, Ohio, N. Y., Ill.

**Bembidium scopulinum** Kirby. Can., Mt. Wash., N. H., Vt., Mich.

LA **Bembidium quadrimaculatum** Linn.\* Nev., Kans., Neb., Can., N. H., Iowa, Mich., Ohio, Vt., N. Y., N. J., Europe, Algeria, Siberia.

**Tachys nanus** Gyll. Can., Alaska, U. S. generally. Found also in Europe, Asia, and Northern Africa.

**Tachys flavicauda** Say.\* Kans., Nebr., Can., Mich., Iowa, Ohio, Vt., N. Y., Fla., N. J., Pa.

**Tachys incurvus** Say. Kans., Nebr., Can., Colo. (Custer Co.), Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., New Mex., Texas.

**Patrobus longicornis** Say. Can., Iowa, Colo. (G., L. V.), Ohio, Vt., N. Y., N. J., Tex., Pa.

**Trechus chalybeus** Mann. Alaska, B. C., Wash., Ore., Cal., Colo., New Mex., Mich., N. H., Mass., Vt., Labrador, Mont.

**Myas cyanescens** Dej. Can., Mich., Vt., N. Y., N. J., Pa.

**Pterostichus adoxus** Say. Can., Iowa, Mich., N. J., N. Y., Ga., Pa., Md., Va., D. C., Wyo.

\ **Pterostichus coracinus** Newm. Can., Mt. Wash., N. H., Iowa, Mich., Ohio, Vt., N. J., N. Y., Va., Tenn., Pa., Ill.

**Pterostichus mutus** Say. Kans., Nebr., Can., Iowa, Mich., Vt., N. J., Pa., Colo.

**Pterostichus luczotii** Dej. Colo., Oreg., Can., Alaska, B. C., Hud. Bay Terr., Me., N. Y., N. H., Pa., Nebr., Mich., Wyo., New Mex., Labrador, Dak.

**Pterostichus patruelis** Dej. Can., Alaska, Hud. Bay Terr., N. Y., N. H., Pa., Mich., Iowa, N. J., Mont.

**Amara lacustris** Lec.\* Can., Wyo., Colo.

**Amara exarata** Dej.\* Can., Ohio, N. J., "Middle States," Pa., Iowa.

- Amara septentrionalis** Lec. Lake Superior (Lec ), Manitoba
- Amara polita** Lec. Kans., Nebr., New Mex , Can., Colo. (Ckll.), Ohio, Mont.
- Amara obesa** Say. N. Y., D. C , Ind., Mich., Mont., Idaho, Hud Bay Ter., Colo., Nebr., Utah, Oreg., Wash , Kans., Can., Iowa, Vt., N. Y., N. J.
- Amara musculus** Say. Penn., Ohio, Ill., D. C., N. C., Nebr., Arizona, Iowa, Mass., Kans., New Mexico, Can., Colo. (Ckll.), N. J., W. Va.
- Diplochila laticollis** Lec. Kans., Nebr., Can., Iowa, Mich., N. Y., Fla., N. J., Ill., Ind., Dak.
- Badister pulchellus** Lec.\* Can., Iowa, Mich., N. Y., Ga., Ind., Idaho.
- Calathus gregarius** Say. Iowa, Kans., Nebr., Can., Mich., Ohio, ✓ Vt., N. Y., N. J. to Fla. and Tex.
- Calathus impunctatus** Say. Can., Mich., N. J., N. Y., Iowa, B. C., Dak.
- Platynus decens** Say. Can., Mich., N. J., N. Y., S. C., Pa., Ill.
- Platynus sinuatus** Dej. Can., Mt. Wash., N. H., Iowa, Mich., Ohio, Vt., N. Y., N. J., Oreg., Hud. Bay Regions, Labrador, B. C., Van. Isl., Mont., Idaho.
- Platynus tenuicollis** Lec. N. J.
- Platynus anchomenoides** Rand. Can., Vt., N. Y., B. C., Mass., Maine.
- Platynus obscurus** Herbst\* Can , Iowa, Mich , N. Y., Idaho, Vt., Mass , Ill., Kans., Oreg.
- Platynus atratus** Lec. Can., N. J., "Eastern and Middle States" (Lec.)
- Platynus propinquus** G. & H.\* Can., N. J., Mass , Nova Scotia.
- Platynus affinis** Kirby.\* Can., Colo. (?) (Ckll.), Mich., N. Y., N. J., Mass.
- Platynus carbo** Lec. Hud. Bay Region.
- Platynus metallescens** Lec. Can., N. J., Hud. Bay Ter.
- Platynus cupripennis** Say. Nev., Cal., Can , N. H., Iowa, New Mex , Colo., (A.) Mich., N. Y., N. J , Oreg., Mont., Wyo., Wash., Van. Isl.

- Platynus excavatus** Dej.\* Can , Mich., Ohio, N. Y., N. J.
- Platynus ferreus** Hald.\* Can., Mich., Ohio, N. Y., N. J.
- Platynus placidus** Say.\* Colo., New Mex., Can , Iowa, Mich., Ohio, N. Y., N. J., Maine, Dak.
- Platynus obsoletus** Say. Colo., Can., Alaska, B. C., Hud. Bay Ter., Mich., N. Y., Iowa, Mt Wash , N. H., Vt., Oreg. If this is the same as *bogemanni* Europe and Siberia may be added.
- Platynus quadripunctatus** De Geer. Can., Alaska, Hud. Bay Ter , N. Y., Pa , Mich., Idaho, Colo , Mont , New Mex., Mt. Wash , N. H., Siberia and Europe.
- Platynus punctiformis** Say.\* Kans , Nebr., Tex., Can.; Ohio, N. Y., Fla., Miss., N. J., Ga., La., Va.
- Platynus picicornis** Lec. Jasper House, Alberta.
- Platynus ruficornis** Lec. Can., Alaska, Iowa, Mt. Wash., N. H., Mich., Ohio, N. Y., N. J.
- Platynus retractus** Lec.\* Can., Mass., Pa.
- Platynus picipennis** Kirby. Can., Mich., N. Y., N. J., Mass., Kans., Pa.
- Olisthopus parmatum** Say. Can., Iowa, Mich., Ohio, N. J., Pa., N. Y., Ind., Ga., Minn.
- Galerita janus** Fabr.\* Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., Kans., Nebr.
- Lebia atriventris** Say.\* Can., Iowa, Mich., Ohio, N. Y., N. J., Va., Pa., Dak.
- Lebia viridis** Say. Colo., Tex. (Mex. boundary), Kans., Nebr., Can., Iowa, Ariz., Mich., Ohio, N. Y., Utah, Fla., N. J., Va., "Maine to Oregon and south to Guatemala" (Horn).
- Lebia pumila** Dej. Kans., Nebr., Can., Mt. Wash., N. H., Iowa, Mich., Ohio, Vt., N. Y., N. J., Maine, Ga.
- Lebia fuscata** Dej. Can., Mich., Ohio, N. Y., Fla., N. J., Mo.
- Lebia furcata** Lec. Kans., Nebr., Can., Colo., New Mex., Ohio, N. Y., Fla., Cal., Mo., Idaho, Tex. (Mex. boundary).
- Dromius piceus** Dej. Can., Iowa, Mich., Ohio, N. Y., N. J., Cal., Mass.
- Apristus cordicollis** Lec.\* N. J., N. Y., Middle States and Can.

- Blechrus nigrinus** Mann. Can., New Mex., Colo., (Ckll.) Iowa, Mich., N. J., N. Y., Cal., Van. Isl., Wyo., Dak., Mo.; perhaps the European-Asiatic *glabratus*.
- Pinacodera limbata** Dej.\* Iowa, Mich., Vt., N. Y., N. J.
- Cymindis cribricollis** Dej. Colo., Oreg., Kans., Nebr., Can., Wash., N. H., Mich., B. C., Newfoundland, N. Mex., Mont., N. Dak., N. W. T., Wyo.
- Cymindis borealis** Lec.\* Vt., North Red River, Nova Scotia.
- Chlænius sericeus** Forst. Cal., Nev., Kans., Nebr., New Mex., Can., Iowa, Colo., Mich., Ohio, Vt., N. Y., Wyo., N. J. Everywhere in U. S. and Canada; also in Mexico.
- Chlænius pennsylvanicus** Say. Cal., Nev., Kans., Nebr., N. Mex., Can., Iowa, Colo., Mich., Ohio, N. Y., Fla., N. J., Oreg., Wash., Ariz.
- Chlænius tomentosus** Say. Kans., Nebr., Can., Iowa, Mich., Ohio, Vt., N. Y., N. J., east of Rocky Mountains generally.
- Brachylobus lithophilus** Say. Kans., Nebr., Colo., Iowa, Can., Ohio, N. Y., N. J., Tex., Dak., Oreg.
- Geopinus incrassatus** Dej. Kans., Nebr., New Mex., Can., Iowa, Mich., Ohio, N. Y., N. J.
- Agonoderus pallipes** Fabr. N. Mex., Tex., Can., Colo., Iowa, Mich., Ohio, Vt., N. Y., N. J., U. S. generally.
- Agonoderus partiaris** Say. Can., Iowa, Mich., Ohio, N. Y., N. J., U. S. generally.
- Harpalus vulpeculus** Say.\* Can., Ohio, N. J., N. Y.
- Harpalus calignosus** Fabr.\* Ariz., Utah, Kans., Nebr., N. Mex., Can., Iowa, Mich., Ohio, Tex., Vt., N. Y., N. J., So. Dak., Ala.
- Harpalus pennsylvanicus** De Geer. Kans., Nebr., New Mex., Can., Iowa, Mich., Ohio, Vt., N. Y., Utah, Fla., N. J.
- Harpalus fallax** Lec.\* New Mex., Vt., N. J., Atlantic States, Van. Isl., Wyo., Nev.
- Harpalus innocuus** Lec. Can., Alaska, N. W. T., Mich., B. C., Wash., Idaho.
- Harpalus rufimanus** Lec. Can., B. C.
- Harpalus lewisii** Lec. Can.
- Harpalus** sp. incog.

**Harpalus oblitus** Lec. vel sp. aff., determination uncertain. *H. oblitus* is found in Nev., Kans., Nebr., New Mex., Colo. (9,500 ft.), B. C.

**Stenolophus fuliginosus** Dej. Can., Iowa, Mich., N. J., N. Y., Wash.

**Stenolophus conjunctus** Say. Can., N. H., Colo., Iowa, Mich., Ohio, N. Y., N. J., "from Atlantic to Pacific" (Lec.)

**Stenolophus ochropezus** Say. So. Cal., Baja Cal., Ariz., New Mex., Kans., Nebr., Can., Iowa, Mich., Ohio, N. Y., Fla., N. J., Atlantic Region generally. A variety occurs in Kamtschatka.

**Tachycellus nigrinus** Dej. Can., Alaska, B. C., Queen Charlotte Isl., Cal., Colo.

**Anisodactylus rusticus** Dej.\* Kans., Nebr., New Mex., Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., "east of Rocky Mts. generally," Colo.

**Anisodactylus harrisii** Lec. Can., Mich., Ohio, Newfoundland, Pa., Ind.

**Anisodactylus discoideus** Dej. Can., Iowa, Mich., Ohio, N. Y., N. J., "Pa. to Mo."

**Anisodactylus baltimorensis** Say. Kans., Nebr., Can., Iowa., Colo., Mich., Ohio, Vt., N. Y., N. J., Atlantic Region generally.

**Anisodactylus terminatus** Say. Kans., Nebr., Can., Iowa, Mich., N. Y., N. J., Vt., Va., Colo.

**Anisodactylus sericeus** Harr. Can., Iowa, Mich., Ohio, N. Y., N. J., west to Nebraska.

#### HALIPLIDÆ.

> **Haliphus ruficollis** De Geer, Laramie, Wyo., Iowa, Col., (7,600-8,000 ft.), Can., Ohio, Vt., N. Y., N. J., Hud. Bay, New Mex., Europe, and Siberia.

#### DYTISCIDÆ.

**Laccophilus maculosus** Germ. Eastern U. S. generally, south to Ga., west to Kans., Can., New Mex., (Ulke.)

**Bidessus** sp. incog. This species I have been unable to identify; and Dr. Horn, to whom it was submitted, remarks that it is different from any in his collection.

- Coelambus impressopunctatus** Schall. Can., (north to 55°,) N. Y., Mass., Pa., Mich., Ill., N. J., Wyo., Alaska; also in Siberia and Europe.
- Hydroporus dimidiatus** G. & H.\* Nebr., Kans., Wyo., Tex.
- Hydroporus tenebrosus** Lec. Can., N. J., B. C., Labrador, Idaho, Mts. of Ariz.
- Hydroporus despectus** Sharp.\* Can.
- Hydroporus longiusculus** G. & H. Alaska. "Identified by description only, as I have no type," (Horn in litt.)
- Hydroporus tartaricus** Lec. Colo., (alpine), Hud. Bay Region, Alaska, Mich.; also found in Siberia and Europe.
- Hydroporus stagnalis** G. & H. Can., Iowa, N. J., Vt.
- Hydroporus terminalis** Sharp.\* Cal.
- Ilybius pleuriticus** Lec.\* Iowa., Pa., N. Y., Colo.
- Ilybius angustior** Gyll. Alaska, Can., (north to 65°), Labrador, Kans.; also in Europe, Lapland.
- Ilybius biguttatus** Germ. Can., Iowa, Mich., Ohio, Vt., N. Y., N. J., Pa., Ga.
- Agabus intersectus** Cr.\* Colo., (Custer Co.) Cal., Wyo., Utah, Oreg., Ind. Ter.
- Agabus stagninus** Say.\* Can., Ohio, Pa.
- Agabus semipunctatus** Kirby. Alaska, Can., Mich., Mo., N. Y., Labrador.
- Agabus æneolus** Cr. Can., Mich., N. Y., Pa., Newfoundland, Labrador, Oreg., Wash.
- Agabus confinis** Gyll. Alaska, Can., (north to 54°), Vt., Mich., Kans., Hud. Bay. Europe, Siberia.
- Agabus anthracinus** Mann. Alaska, Can., Hud. Bay Region, B. C., Van. Isl., Mt. Wash., N. H.
- Agabus morosus** Lec.\* Nev., Colo, San Francisco, Cal.
- Agabus obsoletus** Lec.\* San Diego, Cal.
- Agabus reticulatus** Kirby. Can., Labrador, Mass., N. H., Siberia, Europe.
- Agabus nigroæneus** Er. B. C., N. W. T.
- Rhantus binotatus** Harr. Cal., Baja Cal., Hud. Bay Region south through Can., N. H., Mich., N. Y., Utah, N. J., Kans., Nebr., New Mex., Colo., (Ckll.) B. C.; Mexico, Labrador?

- Colymbetes longulus** Lec.\* Can., Kans.  
**Colymbetes sculptilis** Harr. Can., Iowa, Mich., N. Y., B. C.,  
 N. J., Nebr., Idaho, Oreg., Cal., Labrador, Wyo., Man., Ill.  
**Dytiscus verticalis** Say. Can., N. J., Pa., Ga.  
**Acilius mediatius** Say.\* Iowa, N. Y., Nebr., Pa., Ga.  
**Graphoderes cinereus** Linn. Can., Iowa, Mich., N. J., Pa., N.  
 Y., Ind., Mass., Mo., Cal., Wash., Man., Europe and Siberia.

## GYRINIDÆ.

- ✓ **Gyrinus minutus** Fabr. Can., Mich., Vt., Labrador, Wash., Oreg.;  
 also in Europe and Siberia.  
**Gyrinus ventralis** Kirby. Can., Iowa, Mich., B. C., N. J., Pa., N. H.  
**Gyrinus maculiventris** Lec. Iowa, Mich., New Mex., N. Y.,  
 Mont., Colo.  
**Gyrinus affinis** Aubé. Can., Iowa, Vt., N. J., N. Y., Cal., (Lec.)  
 Labrador, Colo., Mont.  
**Dineutes assimilis** Aubé. Can., Iowa, Mich., Ohio, N. Y., N. J.,  
 Kans., Tex.

## HYDROPHILIDÆ.

- Helophorus lacustris** Lec. Can., Colo., (G., A.) Mich., N. Y.,  
 N. J., Mts. of Ariz.  
**Helophorus inquinatus** Mann. Can., Alaska, Van. Isl.  
**Helophorus tuberculatus** Gyll. Can., Alaska, B. C., Mich., N.  
 Y., N. J., Wash.; also Europe and Asia.  
**Hydrochus squamifer** Lec. Can., Iowa, Mich., N. Y.  
**Ochthebius holmbergi** Mann. Cal. to Nev., Colo., Wyo., Can.  
 and Alaska.  
**Tropisternus lateralis** Fabr. Can.; Atlantic Region generally;  
 through Tex. to Mex. and So. Amer; Baja Cal., New Mex.  
**Tropisternus glaber** Herbst. Can. to Fla., and New Mex., Kans.,  
 Nebr., Iowa.  
**Hydrocharis obtusatus** Say. Can., Iowa, Mich., Vt., N. Y., N. J.,  
 N. H., Idaho.  
**Laccobius agilis** Rand. Kans., Nebr., Iowa, Can., Colo., Mich.,  
 Ohio, N. Y., Utah, N. J., Cal., Oreg.

- Philhydrus nebulosus** Say.\* "Can. to Tex.," Ariz., Cal., Baja Cal., Kans., Nebr., Iowa, Mich., Ohio, N. Y., Fla., N. J.
- Philhydrus hamiltoni** Horn.\* N. J., Can., Mass., Northern Cal., Oreg.
- Hydrobius globosus** Say.\* Can., N. Y., N. J., New England.
- Hydrobius fuscipes** Linn. Can., Alaska, B. C., N. H., Iowa, Colo., Mich., N. Y., N. J., southward to Colo. Riv.; occurs also in Europe and Siberia.
- Creniphilus subcupreus** Say. Kans., Nebr., Iowa, Can., Colo., Mich., Ohio, Vt., N. Y., Utah, Fla., N. J., Oreg., Cal., Ariz., Tex., Va.
- Cercyon prætextatum** Say. Can., Iowa, Mich., Ohio, N. Y., Fla., N. J., Kas., D. C., Utah.
- Cercyon ocellatum** Say. Mich., Vt., Fla., N. J., Utah, Colo.
- Cercyon anale** Payk. Iowa, Mich., N. J., Pa., Ill., La.; also in Europe, Algeria, and Siberia.
- Cryptopleurum minutum** Fabr. Can., Iowa, Mich., Ohio, N. Y., Md., Europe, Siberia, the Amoor country, and Japan.

## SILPHIDÆ.

- Necrophorus orbicollis** Say. Kans., Nebr., Iowa, Can., Mich., Ohio, Vt., N. Y., Nova Scotia, Fla., N. J.
- Necrophorus marginatus** Fabr.\* Ariz., New Mex., Kans., Nebr., Iowa, Can., Colo., Mich., Ohio, Vt., N. Y., Utah, Nova Scotia, N. J., Cal., So. Dak.
- Necrophorus vespilloides** Hbst. Can., N. H., Utah, Ariz., Man., Alaska, B. C., Hud. Bay Ter., to Nova Scotia and N. J.; also China, Europe, Siberia.
- Necrophorus tomentosus** Web.\* Kans., Nebr., Iowa, Can., Vt., Mich., Ohio, N. Y., Nova Scotia, N. J., Va., So. Dak.
- Silpha surinamensis** Fabr. Kans., Nebr., Iowa, Can., Mich., Ohio, Vt., N. Y., Nova Scotia, N. J., Va.
- Silpha lapponica** Herbst. Alaska, Wash., B. C., Oreg., Can., Colo., New Mex., Nev., Cal., Kans., Nebr., Van. Isl., Labrador, Vt., Mich., Iowa, N. Y., Wyo., Nova Scotia, N. J., Idaho, Utah, Europe and Siberia.

**Silpha noveboracensis** Forst.\* Can., N. H., Iowa, Mich., Ohio, Vt., N. Y., Nova Scotia, N. J., Va.

**Silpha americana** Linn. New Mex., Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., Va., "Hudson's Bay to Texas and eastward of that line," (Horn.)

**Choleva basillaris** Say. Kans., Nebr., Can., Alaska, B. C., Cal., Nev. to Colo., White Mts., N. H., Hud. Bay Ter., Ohio, N. J.

**Choleva clavicornis** Lec.\* Can., Iowa, Ohio, N. J., Mich., Tex., Colo.

**Choleva terminans** Lec. Can., N. J., Mass., Va., Ill.

**Ptomaphagus brachyderus** Lec.\* Mich., Nova Scotia, N. Y.

**Colon magnicollis** Mäkl. Alaska, Van. Isl., Mich., Pa.

**Anisotoma assimilis** Lec. N. H., Mich., Can., Colo., Van. Isl.

**Liodes blanchardi** Horn.\* Ohio, Mass.

**Liodes basalis** Lec. (var.) Can., Iowa, Ohio, Pa., Ill.

**Agathidium oniscoides** Beauv.\* Can., Iowa, Mich., Ohio, N. Y., N. J., Ga.

**Agathidium difforme** Lec. White Mts., N. H.

#### SCYDMÆNIDÆ.

**Scydmaenus** sp. incog. A few taken under pine boards along the shore of the lake.

#### PSELAPHIDÆ.

**Batrissus** spp. 3. All these came from beneath the loose bark of dead pine logs.

#### STAPHYLINIDÆ.

**Falagria dissecta** Er.\* N. Y., Iowa, Mich., N. J., Can.

**Falagria** sp. incog.

**Aleochara bimaculata** Grav.\* Can., N. Y., Colo., Utah, New Mex., Ariz., Iowa, N. J., Man.

**Oxypoda** sp. incog.

**Gyrophæna**. Two species were taken in abundance.

**Gymnusa brevicollis** Payk. Can., Mich., Mass., Europe, and Siberia.

- Dinopsis americanus** Kraatz. Iowa, Mich., Can.
- Acylophorus pronus** Er. N. Y., Fla., Mich., N. J., "all over U. S. on both coasts;" also in Can.
- Quedius peregrinus** Grav.\* Ohio, N. J., Iowa, "Can. to the Carolinas," (Horn.)
- Quedius** sp. incog.
- Listotrophus cingulatus** Grav.\* Can., N. Y., Iowa, Ohio, Mich., N. J., "everywhere east of the Rocky Mts., and in Vancouver." (Horn.)
- Creophilus villosus** Grav.\* N. H., N. Y., Colo., Utah, Iowa, Ohio, Fla., Mich., N. J., "from Alaska southward over our entire territory" (Horn), Europe, Asia, Northern Africa.
- Staphylinus fossator** Grav.\* N. H., Mich., N. J., Ga., Can.
- Tympanophorus puncticollis** Er. Can.
- Philonthus æneus** Rossi.\* Can., N. Y., Iowa, Ohio, Mich., N. J., Pa., Mass., Nova Scotia, Hud. Bay, Kans., Colo., Alaska, La., Europe and Asia.
- Philonthus furvus** Nord.\* Wash., Colo., "Newfoundland to Vancouver, southward to Mexico," but probably not in the Eastern States.
- Philonthus varians** Payk.\* N. J., Cal., Colo., Ariz., "nearly cosmopolitan." Europe, Asia, Africa.
- Philonthus cyanipennis** Fabr. Can., N. Y., Iowa, Ohio, Mich., N. J., Ill., east of Mississippi River generally. Europe and Asia.
- Philonthus blandus** Grav. N. Y., Iowa, Ohio, Mich., N. J., Can. to Va. and Ill.
- Actobius** sp. incog.
- Xantholinus obsidianus** Melsh. Can., Iowa, Mich., N. J., N. H.
- Xantholinus obscurus** Er.\* Can., N. Y., Ohio, Mich., N. J., Pa., Utah, Colo., New Mex., to Cal.
- Stenus flavicornis** Er. Can., N. Y., Iowa, Ohio, Mich., Mass., N. J., Ind.
- Stenus femoratus** Say.\* Mich., Ill., Wash., Can.
- Stenus colonus** Er.\* Mich., Fla., Mass., Cal., Ariz., Can.
- Stenus** sp. incog.
- Euæsthetus** sp. incog.

**Lathrobium punctulatum** Lec. Can., Iowa, Ohio, Fla., Mich., N. J., Kans., Ga., Colo., Mass., varieties in Europe and Asia.  
*L. terminatum* Grav. is the oldest name.

**Lathrobium simplex** Lec.\* Can., N. Y., Mass.

**Lathrobium tenue** Lec.\* Mich., N. Y., Can., Colo.

**Lathrobium collare** Er. Iowa, Ohio, Mich., N. J., Can., "Middle States to Vancouver."

**Stilicus dentatus** Say.\* Iowa, Ohio, Mich., N. Y., Mass., Can.

**Lithocharis confluens** Say. N. H., N. Y., Can., Iowa, Ohio, Mich., N. J.

**Pæderus littorarius** Grav. N. Y., Iowa, Ohio, Mich., N. J., Can.

**Sunius longiusculus** Mann.\* N. Y., Iowa, Ohio, Mich., N. J., Oreg., Cal., Can.

**Tachyporus jocosus** Say. N. Y., Iowa, Ohio, Mich., New Mex., N. J., Kans., Ga., Can., Europe and Siberia.

**Tachyporus chrysomelinus** Linn. N. Y., Iowa, Ohio, Mich., N. J., New Mex., Colo., Kans., Can., Ga., Europe and Asia.

**Erchomus ventriculus** Say. N. Y., Iowa, Ohio, Can., Fla., Mich., N. J., "everywhere east of Rocky Mts." (Horn.)

**Conosoma littoreum** Linn. Ohio, Mich., Mass., Nova Scotia, Europe and Siberia.

**Conosoma knoxii** Lec. Mich., Pa.

**Conosoma crassum** Grav. N. Y., Iowa, Ohio, Fla., Mich., N. J., Can. to Gulf States.

**Boletobius niger** Grav.\* Ohio, Mich., Pa., Can., Ill.

**Boletobius cingulatus** Mann. Mich., N. J., Can., Pa., Oreg., B. C., Va., Europe.

**Boletobius intrusus** Horn. Iowa, Ohio, Can., Mich., N. J., Pa.

**Boletobius cincticollis** Say. Can., N. Y., Iowa, Ohio, Mich., N. J., Pa., to B. C. and Cal.

**Boletobius cinctus** Grav. N. Y., Iowa, Ohio, Mich., N. J., "nearly everywhere east of Rocky Mts., and westward to B. C." (Horn.)

**Mycetoporus flavicollis** Lec. N. Y., Ohio, Mich., Fla. Ga.

**Mycetoporus splendidus** Grav. Lake Superior Region and B. C., "Pa., Mich., N. H., Colo., Europe, Asia, North Africa."

**Platystethus americanus** Er. N. Y., Colo., Utah, Iowa, N. J., Cal., B. C., Can.

- Oxytelus rugosus** Grav.\* Mich., N. J., N. Y., Can., Mass., Pa.  
**Oxytelus fuscipennis** Mann. Alaska, B. C., Kans., Ill., Pa., south  
 to Guatemala; Europe and Siberia. The oldest name is *O.*  
*laqueatus* Marsh.  
**Trogophlæus** sp. nov.  
**Trogophlæus** sp. incog.  
**Lesteva pallipes** Lec.\* Iowa, Ohio, Pa., Ala., Md., Mass., N. H.  
 (Mt. Wash.), Can.  
**Acidota subcarinata** Er. Mich., Mass., Can.  
**Homalium lapponicum** Zett.\* Alaska, Can., Colo., Siberia and  
 Europe.  
**Homalium florale** Payk.\* Mich., Pa., Oreg., Can., Europe, Asia  
 and North Africa.  
**Anthobium pothos** Mann.\* Alaska, B. C., Cal., Oreg., Mt. Wash.,  
 (N. H.), Pa., Can.

## TRICHOPTERYGIDÆ.

- Ptenidium** sp. incog.

## SCAPHIDIIDÆ.

- Scaphidium quadriguttatum** Say. Several examples were taken  
 of this species, together with the variety *piceum* Melsh. Kans.,  
 Nebr., Tex., Iowa, Can., Mich., Ohio, N. Y., N. J., Va., La.  
**Scaphisoma convexa** Say. Can., Iowa, Mich., Ohio, Fla., N. J.,  
 "Entire Atlantic Slope, west to the Mississippi" (Casey).

## PHALACRIDÆ.

- Stilbus apicalis** Melsh. Can., Iowa, Colo., Mich., Ohio, N. Y.,  
 Fla., N. J., Tex., Cal.  
**Olibrus pallipes** Say.\* Kans., Nebr., Dak., Man., B. C., Tex.,  
 Pa., N. Y.

## CORVLOPHIDÆ.

- Orthoperus scutellaris** Lec. Colo., N. J., B. C.

## COCCINELLIDÆ.

- Anisosticta strigata** Thunb. Can., Iowa, Mich., N. J., Van. Isl.,  
 Ill., Idaho, Hud. Bay, Europe and Siberia.

**Hippodamia 5-signata** Kirby. Cal., Nev., Can., B. C., N. Y., Kans., Hud. Bay, Man., New Mex., Ariz.

**Hippodamia 15-maculata** Muls. Mo., Nebr.

**Hippodamia convergens** Guér.\* Cal., Nev., Baja Cal., Ariz., New Mex., Colo., Utah, Can., Nebr., Kans., Iowa, B. C., N. J.

**Hippodamia 13-punctata** Linn. Cal., Nev., Idaho, B. C., Nebr., Kans., Can., Alaska, "all America north of Mexico," West Indies, Europe, Asia.

**Coccinella trifasciata** Linn. Can., Alaska, Van. Isl., Hud. Bay., Mich., Colo., New Mex., Wash., Oreg., Cal., Europe and Siberia.

**Coccinella 9-notata** Herbst. Nev., Colo., New Mex., Kans., Nebr., Can., Alaska, B. C., and Atlantic Region generally into Central America.

**Coccinella transversoguttata** Fabr. Nev., Cal., Colo., New Mex., Can., Nebr., N. H., Alaska, B. C., Hud. Bay., Greenland, Mich., Iowa, Kans., Rocky Mts. to Mts. of Mex., Siberia, Japan, China, and Europe.

**Coccinella sanguinea** Linn. U. S. and Can. generally, Baja Cal., West Indies, Europe.

**Adalia bipunctata** Linn.\* Nebr., Kans., Iowa, Can., Mich., Vt., Ohio, N. Y., N. J., Nova Scotia, New Mex., Ariz., B. C., N. H., Europe, Siberia.

**Harmonia picta** Rand. Colo., Can., Mt. Wash., (N. H.), N. Y., Wyo., N. J., Oreg., Hud. Bay, Nova Scotia, Mexico, Pa., New Mex., Van. Isl.

**Harmonia 14-guttata** Linn. Can., Minn., New England, Mich., Europe and Siberia.

**Anatis 15-punctata** Oliv. Can., Iowa, Mich., Ohio, N. Y., Nova Scotia, N. J., West Indies, Europe, Siberia. Said to be *A. ocellata* Linn., which is the older name.

**Psyllobora 20-maculata** Say.\* Eastern U. S. and Can. generally. Replaced in the West (from Oreg. to Baja Cal.) by *teulata* which may be a varietal form.

**Chilocorus bivulnerulus** Muls. Can., Iowa, Mich., Ohio, N. Y., Vt., Fla., N. J., Kans., New Mex.

**Brachyacantha ursina**, var. *10-pustulata* Melsh. Nebr., Kans., Iowa, Can., Colo., Mich., Ohio, Vt., N. Y., N. J., Tex.

**Hyperaspis signata** Oliv. Can., Mt. Wash., (N. H.), Iowa, Vt., Mich., Ohio, N. Y., N. J., Ill., Ga., Nebr.

**Hyperaspis 4-vittata** Lec.\* Kans., Nebr., New Mex., Ill., Cal.

**Scymnus tenebrosus** Muls.\* Mass. to N. C., Ohio.

**Scymnus** sp. incog.

ENDOMYCHIDÆ.

**Lycoperdina ferruginea** Lec. Can., Colo., (Ckl.,) Iowa, Mich., Ohio, N. Y., N. J., "Middle and Southern States."

**Aphorista vittata** Fabr. Can., Iowa, Mich., Ohio, N. Y., N. J., Vt., "Middle and Southern States."

**Mycetina perpulchra** Newm. Can., Mich., Ohio, N. Y., N. J., Mo., "Southern States."

EROTYLIDÆ.

**Tritoma humeralis** Fabr.\* Can., Mich., Ohio, N. Y., N. J., Pa., Ill., Iowa, Mo.

**Tritoma thoracica** Say. Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., Hud. Bay, Ill., Va., Wash., Ga., Tex. ✓

COLYDIIDÆ.

**Cerylon castaneum** Say. Kans., Nebr., Iowa, Can., Mich., Vt., Ohio, N. Y., N. J., "Atlantic to Pacific, Hudson's Bay to Texas." (Horn.)

CUCUJIDÆ.

**Silvanus bidentatus** Fabr.\* Can., Iowa, Ohio, Fla., N. J. Cosmopolitan.

**Silvanus planatus** Germ.\* Kans., Nebr., Can., Iowa, Ohio, N. J., N. Y., Cal.

**Pediacus fuscus** Er. Can., Alaska, B. C., Van. Isl., Mich., Nev., Nebr., Colo., New Mex., Siberia and Europe. Cosmopolitan.

**Læmophlæus fasciatus** Melsh.\* Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J.

CRYPTOPHAGIDÆ.

**Antherophagus ochraceus** Melsh.\* Can., Iowa, Mich., N. Y., Ohio, Colo., N. J., Va.

**Henoticus serratus** Gyll. Can., Alaska, B. C., N. H., south to Va., Colo., So. Cal., Mich. Also found on the Amoor River (Asia) and in Europe.

**Atomaria ephippiata** Zimm. Can., Iowa, Mich., Ohio, N. Y., N. J.

**Cryptophagus** sp. incog.

#### MYCETOPHAGIDÆ.

**Mycetophagus flexuosus** Say. Can., Iowa, Mich., Ohio, N. Y., N. J., Vt., Ind., Ala., Va.

**Litargus didesmus** Say.\* Iowa, Mich., Ohio, N. J., "Middle and Southern States."

**Litargus tetraspilotus** Lec. Can., Iowa, Mich., Ohio, N. Y., Fla.

#### DERMESTIDÆ.

**Byturus unicolor** Say.\* Can., Mt. Wash., (N. H.), Iowa, Ohio, Vt., N. Y., N. J.

**Anthrenus musæorum** Linn.\* Can., Iowa, Mich., Ohio, Vt., N. J., Europe and Siberia.

**Orphilus glabratus** Fabr.\* Can., Iowa, Mich., Ohio, N. Y., Utah, Cal., Fla., N. J., Va., Europe and Asia.

#### HISTERIDÆ.

**Hister fœdatus** Lec.\* Can., Mich., Vt., N. Y., "Can. to Ga. and westward to Vancouver and Oreg." (Horn.)

**Hister abbreviatus** Fabr. Kans., Nebr., Can., Colo., Iowa, Ohio, Mich., N. Y., Fla., N. J., Ga., Mont.

**Hister depurator** Say. Kans., Nebr., Can., Colo., (Ckll.,) Iowa, Mich., Vt., N. Y., Fla., N. J.

**Hister furtivus** Lec.\* Can., Iowa, Mich., N. Y., N. J. to Ga.

**Hister bimaculatus** Linn.\* Can., Iowa, Mich., Vt., N. Y., N. J., Europe.

**Hister americanus** Payk. Kans., Nebr., Can., Iowa, Mich., Vt., Ohio, N. Y., Fla., N. J., Ga., Ill.

**Saprinus lugens** Er.\* Oreg. eastward to Colo., Kans., south to Tex., Ariz., Baja Cal.; Ohio.

- Saprinus pensylvanicus** Payk. Can., Iowa, New Mex., Colo., N. J., N. Y., "everywhere in U. S. east of Rocky Mts." (Horn.)
- Saprinus oregonensis** Lec. Oreg., Cal., Baja Cal., Can., Colo., (Ckll.) Utah, New Mex., Wyo., Ariz.
- Saprinus sphæroides** Lec. Mich., N. J., "Middle States and Canada," (Horn.)
- Saprinus fraternus** Say. Can., Colo., (8,000 ft.) Mich., N. Y., Ohio, N. J., Mass., R. I.
- Plegaderus sayi** Mars. Can., Colo., (9,400 ft.) "Middle States." (Horn.)

## NITIDULIDÆ.

- Carpophilus niger** Say.\* Can., Mich., Ohio, N. Y., N. J., Cal., Ariz.
- Carpophilus brachypterus** Say. Can., Mich., Ohio, N. Y., N. J., Pa., Cal.
- Colastus truncatus** Rand. Can., Iowa, Mich., Ohio, Fla., N. J., Tex., Cal.
- Conotelus obscurus** Er.\* Can., Iowa, N. Y., Ohio, Vt., Fla., N. J.
- Epuræa immunda** Sturm. Mich., "Alaska to Mass.," Europe.  
Dr. Hamilton replaces the name by *terminalis* Mann.
- Epuræa avara** Rand.\* Mich., Ohio, N. J., "all over U. S. and Can." (Horn.)
- Epuræa truncatella** Mann. Can., Alaska, B. C., Wash., Colo., Cal., New Mex., Mich.
- Epuræa erichsonii** Reitt. (?) Doubtfully recorded from Colo., (9,400 ft.) Found in Mich., Ohio, "Can. to Ga." (Horn.)
- Phenolia grossa** Fabr.\* Kans., Nebr., Iowa, Can., Mich., Ohio, Vt., N. Y., N. J., Va., Tex.
- Omosita colon** Linn.\* Kans., Nebr., Iowa, Can., Mich., Ohio, Vt., N. Y., Fla., N. J., Europe.
- Cyllodes biplagiatus** Lec. Mich., N. Y., Mass.
- Ips fasciatus** Oliv. Kans., Nebr., Can., N. H., Iowa, Mich., Vt., Ohio, N. Y., N. J., Van. Isl., "entire region east of the Rocky Mts." (Horn.) Also in Europe (*A-guttatus* Fabr.), Hamilton.
- Rhizophagus scalpturatus** Mann.\* Alaska, Van. Isl., Nev., N. Y., Colo.

## LATHRIDIDÆ.

**Lathridius.** Several species. These have not been studied lately and the identification of North American species is a matter of much uncertainty.

**Corticaria.** The species of *Corticaria* are now in confusion. A few were taken more or less abundantly.

## TROGOSITIDÆ.

**Tenebrioides collaris** Sturm. Ga., Can., Mich., N. J.

**Peltis ferruginea** Linn. Can., Vt., Maine, Pa., Hud. Bay., Cal., Oreg.; also Europe and Siberia.

**Thymalus fulgidus** Er. Can., Iowa, Mich., Vt., N. Y., N. J.

**Monotoma picipes** Herbst.\* N. J., "Middle States to Tex. and Cal., probably introduced from Europe."

## BYRRHIDÆ.

**Pedilophorus subcanus** Lec. Wash.

**Cytilus trivittatus** Melsh. Can., Mich., Northern U. S.

**Byrrhus americanus** Lec. Can., Colo., (9,400 ft.,) Mich., Vt., N. Y., N. J., Labrador.

**Byrrhus cyclophorus** Kirby. Can., Alaska, Hud. Bay, Mich., B. C., Colo., N. Y.

## PARNIDÆ.

**Helichus striatus** Lec. Can., Cal., Ariz., New Mex., Colo., Vt., Iowa, N. Y., N. J.

## HETEROCERIDÆ.

**Heterocerus undatus** Melsh., et var. *substriatus* Kies. Can., Iowa, Ohio, N. J., to Wyo. and southward.

## DASCYLLIDÆ.

**Eucinetus terminalis** Lec. Several specimens taken in slime-moulds of the genus *Stemonitis*. Can., Colo., (Ckll.,) Iowa, Mich., Ohio, N. Y., N. J., Vt., Ill.

- Cyphon obscurus** Guér.\* Can., Iowa, Ga.  
**Cyphon variabilis** Thunb. Can., Alaska, Van. Isl., Hud. Bay,  
 south to Fla. and Tex.; also occurs in Europe, Asia and Algeria.

## ELATERIDÆ.

- Deltometopus amœnicornis** Say. Pa., N. Y., Ohio, Ind., Iowa,  
 Can., Mich., Vt., Fla., N. J.  
**Dromæolus harringtoni** Horn.\* Can., N. H., N. Y.  
**Fornax orchesides** Newm.\* N. Y., Can., Iowa, Ohio, Vt., New  
 England.  
**Adelocera aurorata** Say. N. H., Can., Iowa, Mich., Ohio, N. Y.  
 ✓ **Adelocera brevicornis** Lec. Lake Superior, Can. ✓  
**Cardiophorus convexulus** Lec. Maine, Can., Colo., Utah, (9,-  
 500 ft.,) Mich., Ohio, Vt., White Mts., (N. H.), Mass.  
**Cryptohypnus bicolor** Esch. Considered a small form of *nocturnus*.  
 Alaska, Oreg., Hud. Bay, Dak., Idaho, Utah, Mont.,  
 Colo., New Mex., Can., Labrador, N. H., Northern Asia.  
**Cryptohypnus abbreviatus** Say. Nova Scotia, Can., N. Y., Pa.,  
 Mass., to Oreg. and Alaska; Mich.  
**Elater hepaticus** Melsh.\* Pa., Vt., Can., Ohio, N. J., "Middle  
 and Western States" (Lec.) ✓  
**Elater pedalis** Germ. Pa., N. Y., Can., Mt. Wash., (N. H.), Vt.,  
 Ohio, N. J., Mich., B. C.  
**Elater rubricus** Say. N. Y., N. H., Va., Can., Iowa, Mich., N. J.  
**Elater apicatus** Say. Can., Northern U. S. generally, Mt. Wash., ✓  
 (N. H.), Mich., Vt., N. Y. to Colo., Wash., Cal., Oreg.  
**Elater obliquus** Say.\* N. Y., Pa., Iowa, Can., Mich., Ohio, N. J.,  
 Ill., Ga.  
**Megapenthes stigmus** Lec. Cal., Oreg., B. C., Alaska, Can.,  
 Colo., Wash.  
**Megapenthes rogersi** Horn.\* Canada.  
**Agriotes stabilis** Lec. Lake Superior, Can., Mich., N. Y.  
**Agriotes fucosus** Lec. Vt., Can., Mich., N. Y., "North-eastern  
 States through Can., Hud. Bay Ter., B. C., Oreg., Cal." (Lec.).  
**Agriotes pubescens** Melsh. Pa., Iowa, Can., Mich., N. Y., N. J.,  
 Ohio.

- ✓ **Agriotes limosus** Lec. Lake Superior, Can., Mt. Wash., (N. H.), Newfoundland.
- Dolopius lateralis** Esch. Cal., Nev., Baja Cal., Arizona, Kans., Nebr., B. C., Van. Isl., Can., Iowa, Colo., Tex., Ark., Atlantic States generally. Very variable.
- Melanotus scrobicollis** Lec. N. Y., Pa., Can., Mich. Synonymous with the following species, according to Dr. Hamilton.
- Melanotus castanipes** Payk. Can., Mich., Ohio, Vt., Colo., Pa., N. Y., N. H.; also in Europe and Siberia.
- Melanotus communis** Gyll. Kans., Nebr., Can., Cal.; common over most of the region east of the Missouri River.
- Limonius plebejus** Say.\* N. Y., Pa., Can., Mich., N. J.
- Limonius æger** Lec. Described from Lake Superior specimens. Can., N. J.
- Campylus denticornis** Kirby. Maine, Pa., Can., Mt. Wash., (N. H.), Mich., Ohio.
- Athous rufifrons** Rand. N. Y., Pa., Can., Mich., Ohio.
- Corymbites virens** Sch. Maine, Can., north to 65°, Mt. Wash., (N. H.), Mich., Man., Northern Asia.
- Corymbites resplendens** Esch. Maine, N. H., Newfoundland, Alaska, Queen Charlotte Isl., Vt., Mich.
- Corymbites spinosus** Lec. Lake Superior, Can., Mt. Wash., (N. H.), Iowa.
- Corymbites falsificus** Lec. Canada.
- ✓ **Corymbites medianus** Germ. Can., Mt. Wash., (N. H.), N. Y.
- Corymbites triundulatus** Rand. Maine, Can., Mt. Wash., (N. H.), Colo., (8,000 ft.,) Vt.
- Corymbites hamatus** Say. N. J., Can., Vt., N. Y.
- Corymbites propola** Lec. N. Y., B. C., Can., Mt. Wash., (N. H.), Vermont.
- Corymbites hieroglyphicus** Say. Ohio, Maine, Can., Mt. Wash., (N. H.), Iowa, Mich., Vt., N. Y., Nova Scotia, N. J.
- ✓ **Corymbites æripennis** Kirby. Maine, N. H., Can., B. C., Oreg., Idaho, Van. Isl., Colo., (Red Cliff, Veta Pass), N. Y., Nova Scotia.
- Corymbites aratus** Lec. Lake Superior, Can.

**Corymbites metallicus** Payk. Lake Superior, Can., Iowa, Colo., (8,000–9,400 ft.,) Mich., N. J., Mass., Europe and Siberia. Dr. Hamilton calls it *nigricornis* Payk.

**Asaphes indistinctus** Lec.\* The determination is by Dr. Horn. Ohio, N. C., Georgia.

**Asaphes memnonius** Herbst.\* Maine, Ohio, Iowa, Ala., Can., Pa., Mich., N. Y., Nova Scotia, N. J., Colo.

## THROSCIDÆ.

**Throscus punctatus** Bonv. Canada to Georgia.

**Throscus constrictor** Say. Middle and Southern States and Canada. These two species have lately been referred to *Aulonothroscus* by Dr. Horn.

## BUPRESTIDÆ.

**Chalcophora virginiensis** Drury. Can., Colo., (Ckll.,) Mich., N. Y., Nova Scotia, Fla., N. J., Mass., Va. Perhaps the European *C. mariana* may be the same, (cf. Hamilton t. c.).

— **Dicerca prolongata** Lec. Kans., Nebr., Can., Colo., (Ckll.,) N. J., Mass., N. H.

**Dicerca divaricata** Say. Can., Iowa, Mich., Ohio, N. Y., N. J., Vt., Mass., N. H.

— **Dicerca tenebrosa** Kirby. Can., Mass., N. H.

**Dicerca tuberculata** Chevr. Can., N. H., Mass.

**Dicerca punctulata** Sch.\* N. Y., N. J., Mass.

**Pœcilonota cyanipes** Say.\* Kans., Nebr., Colo., Can., Mass., Iowa, Mich., N. Y., N. J.

**Buprestis nuttalli** Kirby. Can., N. J., Mass.

— **Buprestis maculiventris** Say. Kans., Nebr., Can., Mt. Wash., (N. H.), Colo., (Ckll.,) Mich., Vt., N. Y., Utah, Mass.

**Buprestis fasciata** Fabr. Canada, North-eastern U. S. generally. The variety *langii* is found in Alaska, B. C. and the mountains of the Western States. ✓

— **Buprestis striata** Fabr. Can., Pa., Mich., N. Y., N. J., Mass.

— **Melanophila longipes** Say. Can., Alaska, Van. Isl., Hud. Bay, south to Va., Ky., New Mex. and So. Cal. If this is *appendiculata* Fabr., add also Siberia, China and Europe.

- \ **Melanophila drummondi** Kirby.\* Maine to Alaska, Cal., New Mex. Dr. Hamilton calls it *guttulata* Gebl., which is known from Northern Asia.  
**Melanophila æneola** Melsh. Can., Middle and Southern States.  
**Chrysobothris femorata** Fabr. "Can., all the U. S., extending into Mex." (Horn).  
**Chrysobothris dentipes** Germ. Can., Mt. Wash., (N. H.), Iowa, Mich., "all the States east of the Mississippi and from Missouri westward to Oregon," (Horn).  
**Chrysobothris scabripennis** Lap. and Gory. Can., N. Y., Mt. Wash., (N. H.).  
**Agrilus otiosus** Say.\* Canada and New England, west to Kans., south to Tex. (Horn).  
**Agrilus bilineatus** Web. Maine, west to Rocky Mountains, south to Texas. (Horn).  
**Agrilus granulatus** Say.\* New England to Missouri.  
**Agrilus anxius** Gory. Mass. and N. H., west to Colo.  
**Agrilus politus** Say. Can. and New England, west to the Pacific Coast, Kans., Colo., New Mex., Ariz., Nev., Cal., on Atlantic Coast south to Maryland and the Ohio River (Horn).

## LAMPYRIDÆ.

- Celetes basalis** Lec. Can., Mt. Wash., (N. H.), N. Y., Fla., N. J., "Atlantic Region."  
**Cænina dimidiata** Fabr. Can., N. Y., N. J., "Atlantic Region." (Lec.).  
**Eros thoracicus** Rand. Can., Iowa, Mich., Ohio, N. J., Maine.  
**Eros aurora** Herbst. Can., Alaska, Oreg., Hud. Bay, Eastern U. S. south to Ga. and Miss., Colo., (Ckll.,) Iowa, Ohio, N. J.; also in Europe, Siberia, North Africa.  
**Eros sculptilis** Say.\* Can., Mt. Wash., (N. H.), Mich., Ohio, N. Y., "Southern States," (Lec.).  
**Eros humeralis** Fabr. Can., Mich., Vt., N. Y., "Atlantic Slope." (Lec.).  
**Eros crenatus** Germ. Can., Vt., N. Y., Maine.

- Plateros canaliculatus** Say.\* Can., Iowa, N. Y., Fla., N. J., Pa.  
**Calochromus perfaceta** Say. Can., Ohio, Vt., N. Y., N. J., Va.,  
"Atlantic Region" (Lec.).  
**Lucidota atra** Fabr. Can., Mt. Wash., (N. H.), Iowa, Ohio, Vt.,  
Mich., N. Y., Fla., N. J., Ga.  
**Ellychnia corrusca** Linn. Kans., Nebr., Can., Mt. Wash., (N.  
H.), Colo., (Ckll.,) Iowa, Mich., Ohio, N. Y., Nova Scotia, Va.,  
N. J., Hud. Bay.  
**Pyropyga fenestralis** Melsh.\* Pa. (?), Cal., Colo.  
**Pyractomena borealis** Rand. Can., Colo., (Ckll.,) Mich., Ohio,  
N. Y., Maine, Mass., Tex., Mont.  
**Photinus ardens** Lec. Can., Mich., N. Y., Mass., Kans.  
**Lamprohiza inaccensa** Lec. Mich.  
**Photuris pensylvanica** De Geer. Kans., Nebr., Tex., Can., Iowa,  
Mich., Ohio, N. Y., Nova Scotia, Fla., N. J.  
**Podabrus nothoides** Lec.\* Can., Mass.  
**Podabrus diadema** Fabr. Can., Mt. Wash., (N. H.), Iowa, Vt.,  
Mich., N. Y., N. J., "Atlantic Region." ✓  
**Podabrus modestus** Say. Can., Iowa, Mich., Ohio, N. Y., Pa.,  
N. J., Ga.  
**Podabrus punctatus** Lec. Can., Iowa, Pa.  
**Telephorus fraxini** Say. Can., Alaska, "Sitka to New Mex.,"  
(Hamilton), "Hudson's Bay, southward to Virginia," Colo.,  
Ohio, Vt., N. Y., N. J., Labrador.  
**Telephorus lineola** Fabr. Can., Iowa, Mich., Ohio, N. Y., N. J.,  
Tex., Fla.  
**Telephorus rectus** Melsh. Can., Iowa, Mich., N. Y., N. J., Ill.,  
Fla., Pa.  
**Telephorus flavipes** var. *dichrous* Lec. Kans., Nebr., Can., Ohio,  
Mich., N. Y., N. J., Ill., Tex.  
**Telephorus rotundicollis** Say. Can., Mich., Vt., N. Y., N. J.,  
Va., Ill.  
**Telephorus curtisii** Kirby. Mt. Wash., (N. H.), Iowa, B. C.,  
Hud. Bay.  
**Malthodes fuliginosus** Lec.\* Mt. Wash., (N. H.).

## MALACHIDÆ.

- Collops vittatus** Say. Baja Cal., Ariz., New Mex., Colo., Tex., Mex. boundary, Nev., Cal., Can., Mich., Wyo.  
**Anthocomus erichsoni** Lec. Can., Mich., Ohio, N. Y., "Middle States."  
**Pseudebæus oblitus** Lec.\* Can., Mich., Fla., N. Y., N. J., Ga.  
**Attalus morulus** Lec.\* Colo., (7,600-8,000 ft.) Mich., Ohio, Vt., Fla., N. J., Kans., D. C.

## CLERIDÆ.

- Trichodes nuttalli** Kirby.\* Kans., Nebr., Iowa, Can., Mich., Vt., N. Y.  
**Clerus quadriguttatus** Oliv. Can., Iowa, Colo., Mich., Ohio, N. Y., N. J.  
**Clerus ichneumoneus** Fabr.\* Can., Ohio, Pa., Fla.  
**Thanasimus trifasciatus** Say.\* Can., N. Y.  
**Thanasimus undatulus** Say. var. *nubilus* Klug. Can., N. W. T., Alaska, N. H., Mich., Kans., Colo., (9,500-11,500 ft.) New Mex., Vt., N. Y.  
**Chariessa pilosa** Forst.\* Kans., Nebr., Mo., Iowa, Can., N. Y., Ohio, Fla.

## PTINIDÆ.

- Ptinus quadrimaculatus** Melsh.\* Pa., Iowa.  
**Hadrobregmus pumilus** Lec.\* N. J., Can.  
**Xyletinus lugubris** Lec.\* Mich., Can.  
**Dorcatoma setulosum** Lec.\* Pa., Ga., N. C., Lake Superior, Ohio, Mich., N. J., Can.  
**Dorcatoma pallicorne** Lec. Mt. Wash., (N. H.), Mich., Can.  
**Ptilinus ruficornis** Say. Iowa, Fla., N. Y., Ohio, Mich., N. J., Canada.  
**Dinoderus porcatus** Lec.\* N. Y., Fla., N. J., Can.

## CIOIDÆ.

- Cis** sp. incog.

## LUCANIDÆ.

- Platycerus quercus** Web. Kans., Nebr., Can., Iowa, Mich., Vt., Ohio, N. Y., N. J., Pa., N. C., D. C.
- Platycerus depressus** Lec. Can., Mt. Wash., (N. H.), Mich., N. Y., Dak., Colo., Hud. Bay Region.
- Ceruchus piceus** Web. Can., Iowa, Mich., Ohio, N. Y., N. J., Pa., D. C., Va.
- Nicagus obscurus** Lec.\* Can., Ind., Mich., N. Y., N. J.

## SCARABÆIDÆ.

- Onthophagus hecate** Panz.\* Kans., Nebr., Iowa, Mich., Tex., New Mex., Can., Ohio, Vt., N. Y., Fla., N. J., Va., entire region east of Rocky Mountains, (Horn).
- Atænius imbricatus** Melsh.\* Mich., Fla., N. J., "Mass. to Tex.;" also from Mexico to Brazil and West Indies.
- Aphodius hamatus** Say. Canada, Maine to Oregon; mountains from New Mexico to Hudson's Bay.
- Aphodius fimetarius** Linn.\* Can., Eastern U. S. generally, Iowa, Kans., Mich.; introduced from Europe.
- Aphodius granarius** Linn. U. S. and Canada generally, Baja Cal., British Columbia, Europe.
- ✓ **Geotrupes blackburnii** Fabr.\* Can., Mich., Ohio, N. Y., N. J.
- Hoplia trifasciata** Say. Can., Mich., Vt., Pa., N. Y., N. J.
- Dichelonycha subvittata** Lec. Can., Iowa, Ohio, Vt., N. Y.
- Dichelonycha albicollis** Burm. Can., Mich., N. Y., N. J.
- ✓ **Serica vespertina** Gyll. Kans., Nebr., Can., Iowa, Mich., Ohio, Vt., N. Y., Nova Scotia, Fla., N. J.
- Serica sericea** Ill. Kans., Nebr., Can., Iowa, Mich., Ohio, Va., N. Y., N. J.
- Diplotaxis sordida** Say. Can., Mich., N. J.
- Diplotaxis tristis** Kirby.\* Baja Cal., Texas, Colo., Can.
- Lachnosterna grandis** Smith.\* Nova Scotia to D. C., Ga., Texas, Iowa, Nebr., Wis., Can.
- Lachnosterna hirticula** Knoch.\* Nebr., to N. C., north to Can.
- Cotalpa lanigera** Linn. Can., Iowa, Mich., Ohio, N. Y., N. J.

**Aphonus tridentatus** Say.\* Kans., Nebr., New Mex., Can., Ohio, Iowa.

**Trichius affinis** Gory. Can., Mt. Wash., (N. H.), Iowa, Mich., Ohio, N. Y., Colo., Nova Scotia, N. J., Va.

## CERAMBYCIDÆ.

**Tragosoma harrisii** Lec. Can., Colo., (Ckll.,) Ariz., (7,000 ft.,) Mich., "Newfoundland to Vancouver Island and through the Rocky Mountains into New Mexico," Vt., N. Y., N. J.; placed by Hamilton as a synonym of *depsarium* Linn., which has a European and Asiatic distribution.

**Asemum mœstum** Hald. Pa., Mass., Can., Alaska, B. C., N. Y., New England, the Eastern U. S. to Fla., west to La., and New Mex.; Iowa, Colo., (9,400 ft.,) Ohio, N. J.

**Criocephalus agrestis** Kirby. New Mex., Colo., Ariz., Kans., Nebr., Md., Va., Can., Vt., N. Y., Nova Scotia, N. J.

**Tetropium cinnamopterum** Kirby. Can., Alaska, B. C., Wash., Oreg., Cal., N. W. T., south to N. J. and Pa.; Mountains of Arizona, Vt.

**Physocnemum brevilineum** Say.\* Kans., Nebr., Ark., Pa., Can., Iowa, Mich., N. Y., N. J.

**Merium proteum** Kirby. Can., Alaska, B. C., Hud. Bay, Pa., Colo.

**Callidium antennatum** Newm.\* Can., Colo., Ohio, N. Y., N. J.

**Elaphidion parallelum** Newm. Can., Iowa, Mich., Ohio, N. Y., Fla., N. J.

**Tylonotus bimaculatus** Hald.\* Pa., Can., Iowa, Ohio, N. Y., N. J.

**Callimoxys sanguinicornis** Oliv.\* Can., Iowa, Ohio, N. Y., "U. S. east of Rocky Mountains."

**Purpuricenys humeralis** Fabr.\* Kans., Nebr., Pa., Mass., Can., Iowa, N. J., Ohio, Mo., N. Y., Texas, Va.

**Plagionotus speciosus** Say. Mass., Can., Iowa, Vt., N. Y., Pa., N. J., Maine.

**Callioides nobilis** Say. Ariz., Can., N. H., Iowa, Mich., N. Y., Utah, N. J.

**Arhopalus fulminans** Fabr. Can., Iowa, Mich., Ohio, N. Y., N. J.

**Xylotrechus colonus** Fabr. Can., N. H., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., "U. S. east of Rocky Mountains."

- Xylotrechus sagittatus** Germ.\* New Mex., Can., Mich., N. Y., N. J., Ga., Fla., Pa., Mass., Ariz.
- ↪ **Xylotrechus undulatus** Say. et var's. *lunulatus* Kirby, *interruptus* Lap. Kans., Nebr., N. W. T., Can., N. H., Iowa, Mich., N. J., Colo., N. Y., B. C.
- Xylotrechus annosus** Say. Idaho, Colo., Van. Isl., Mo., Mont., Cal., Texas, Maine, N. H.
- Neoclytus muricatus** Kirby. Can., Colo., (Ckll.) N. Y., Cal., N. H., Utah, Wyo., Hud. Bay, Mass., Va., Maine, La.
- Neoclytus erythrocephalus** Fabr.\* Kans., Nebr., Texas, Iowa, N. C., Va., Pa., Mass., Can., Mich., Ohio, Vt., N. Y., N. H., N. J., La., Del., Ga. Accidentally imported into Europe.
- Clytanthus ruricola** Oliv. Can., Iowa, Mich., Ohio, Vt., N. Y., N. J., Va., Ill.
- Cyrtophorus verrucosus** Oliv.\* Mass., Pa., N. C., Can., Mich., N. Y., N. J., S. C., Ga.
- Desmocerus palliatus** Forst.\* Mass., Can., Iowa, Mich., N. Y., N. J., La., N. C., Conn., Va.
- Rhagium lineatum** Oliv. Colo., Ariz., New Mex., Can., Alaska, Queen Charlotte Isl., Atlantic district south to Florida in pine regions: Mts. of Arizona. Varieties occur in Europe and Asia.
- Centrodera decolorata** Harr. Can., Mich., N. Y., N. J., Mass.
- Pachyta monticola** Rand. Can., Alaska, Maine, N. Y., Pa., Mt. Wash., (N. H.), Vt., Mass., Anticosti Isl.
- ↪ **Acmaeops proteus** Kirby. Can., Mt. Wash., (N. H.), B. C., N. Y., Colo., (8,000–9,400 ft.) Hud. Bay, Oreg., Mont., Kans., New Mex., Mass., Labrador.
- Acmaeops pratensis** Laich. Can., Alaska, B. C., Alberta, through Rocky Mts. to Colo. and New Mex.; Wyo., Mich., Maine, Utah, Mont., Oreg., Siberia, China, Europe.
- Gaurotes cyanipennis** Say. Ark., Mass., Ky., Mich., Can., Mt. Wash., (N. H.), Iowa, Ohio, Vt., N. Y., N. J., Pa., Va., N. C.
- **Bellamira scalaris** Say. Can., Mich., N. Y., N. J., N. H., Md., Pa., Va., La.
- Typocerus velutinus** Oliv.\* Can., Iowa, Mich., Ohio, Vt., Fla., N. Y., N. J., Ga., Va., Pa., N. H., Dak., Ind. Ter., La., Maine.

- Leptura plebeja** Rand. Can., Mt. Wash., (N. H.), N. J., Mich., N. C., Maine.
- Leptura subhamata** Rand. Can., N. Y., N. H., Mich., N. J., Pa., Va., N. C., Ill., Mass.
- Leptura lineola** Say. Mass., N. Y., Pa., N. C., Miss., Can., Ohio, Vt., N. J., Va., Texas, Md., N. H.
- Leptura americana** Hald.\* Pa., Iowa, Ohio, N. Y., Ind. Ter., Ga.
- **Leptura subargentata** Kirby. Can., B. C., Alaska, Van. Isl., Wash., Cal., Mont., Nev., Colo., New Mex., Mich., Hud. Bay, N. Y., Mass., N. H., Utah, Ga.
- Leptura nitens** Forst.\* Mass., Can., Iowa, Mich., N. Y., N. J., Pa., N. C., Ill., Texas, Ga.
- **Leptura sexmaculata** Linn. Can., Mt. Wash., (N. H.), Mich., Colo., Van. Isl., Hud. Bay. Also in Europe and Siberia.
- **Leptura nigrella** Say. Can., Hud. Bay, Mich., Wash., New Mex., Nev., Colo., Ga., Maine.
- **Leptura canadensis** Fabr. New Mex., Kans., Nebr., Mass., Pa., Can., N. H., Colo., (Ckll.,) N. Idaho, Vt., N. Y., Nova Scotia, Mich., Va., Van. Isl., Mo., Ga., Oreg.; probably the same species occurs also in Europe and Asia.
- Leptura rubrica** Say. Kans., Nebr., Can., Iowa, Mich., N. Y., N. J., Mass., Va., Ga., Ill., Pa., Colo.
- Leptura vagans** Oliv. Can., N. Y., N. J., N. H., Mass., Maine, Pa., Va., N. C., Ga., Mich.
- Leptura sanguinea** Lec. Can., Colo., (9,400 ft.,) Wash., Cal., Van. Isl., New Mex., Nev., Mich., N. H., Oreg.
- **Leptura chrysocoma** Kirby. New Mex., Wash., Colo., (Ckll.,) Can., Utah, Nova Scotia, Hud. Bay, Mich., Idaho, Maine, Van. Isl., N. Y., Oreg., Cal., Nev., N. H.
- **Leptura proxima** Say. Can., Iowa, Mich., Vt., N. Y., N. J., N. H., Va., Ga., Ohio, Mo., Ill., Mass., Pa.
- Leptura octonotata** Say.\* Can., N. Y., N. J., Mass., Pa., Va., Ala., Miss., Ill.
- Leptura pedalis** Lec. Mt. Wash., (N. H.), Mich., Anticosti Isl.
- Leptura vittata** Germ. Mass., Ala., Can., Iowa, Mich., Ohio, Vt., N. Y., Nova Scotia, N. J., N. H., Pa., Va., Ga., Ill., La., Maine.

**Leptura pubera** Say. Pa., Can., Iowa, N. J., N. H., Va., Mass., Ill., Ga., N. Y.

**Leptura ruficollis** var. *sphericollis* Say. Can., Mt. Wash., (N.H.), Mich., Ohio, N. Y., Mass., Ky., Pa., Maine.

**Leptura vibex** Newm. Can., Mt. Wash., (N.H.), Mich., N. Y., Ohio, Conn., Pa., W. Va.

➤ **Leptura mutabilis** Newm., et var. *luridipennis* Hald. Can., Mt. Wash., (N. H.), N. Y., Mass., N. J., Pa., Mich.

**Monohammus titillator** Fabr.\* Ohio, N. Y., Fla., N. J., "Can. to Wash., and south to Fla." (Horn).

**Monohammus scutellatus** Say. New Mex., Alaska, (Yukon), B. C., Can., Van. Isl., Hud. Bay, "through North America generally in most pine regions" (Hamilton). ✓

**Monohammus confusor** Kirby. Can., Mich., Ohio, N. Y., N. J., New England.

**Monohammus marmorator** Kirby. Can., Maine, Mich.

**Acanthoderes decipiens** Hald. Kans., Nebr., Iowa, Can., Ohio, Mich., N. Y., Fla., N. J.

**Leptostylus aculiferus** Say.\* Kans., Nebr., Iowa, Can., Ohio, N. Y., Fla., N. J.

**Leptostylus commixtus** Hald. D. C., Mass., Can., Mich., Ohio, N. Y., N. J.

**Hyperplatys aspersus** Say.\* Can., Iowa, Vt., N. Y., N. J.,

**Urographis fasciatus** De Geer. Can., Iowa, Mich., Ohio, N. Y., Vt., Fla., N. J.

**Acanthocinus obsoletus** Oliv. Can., Mich., Ohio, N. Y., N. J., Florida.

**Pogonocherus mixtus** Hald. Can., N. H., Colo., (Ckll.) New Mex., (7,000 ft.) Mich., N. Y., N. J.

**Eupogonius tomentosus** Hald.\* Can., Iowa, Mich., N. Y., N. J., Florida.

**Saperda obliqua** Say.\* Can., Mich., N. Y., N. J.

**Saperda calcarata** Say. Kans., Nebr., Can., Iowa, Ohio, N. Y., New Jersey.

**Saperda vestita** Say.\* Mass., Pa., Mich., Can., Iowa, Ohio, Vt., N. Y., N. J.

**Saperda tridentata** Oliv.\* Mass., Pa., N. Y., N. J., D. C., Ala., Iowa, Can., Mich., Ohio, Vt.

**Oberea tripunctata** Swed.\* Mass., Pa., N. C., Can., Iowa, N. Y., Colo., Ga.

CHRYSOMELIDÆ.

**Donacia subtilis** Kunze. Can., Iowa, Mich., N. Y., N. J., Dak., Wis., N. Ill., Colo., Ohio, Pa., Mass., N. H.

**Donacia distincta** Lec. N. J., Mich., Mass.

**Donacia rufa** Say. Can., Mass., N. H., N. Y., Ohio, Texas.

**Orsodachna atra** var. *childreni* Kirby. The species crosses the continent from New England to Canada, extending southward mostly on mountain ranges. Iowa, Colo., N. C.

**Zeugophora varians** Crotch. Pa., Ill., Kans., Wash., Can., N. Y., N. J., Mich.

**Syneta ferruginea** Germ. Newfoundland, Can., N. H., Mass., N. Y., Mich., Nebr., Ohio, Md., Iowa, Colo., (11,500 ft.) N. J., Vermont.

**Chlamys plicata** Fabr.\* Can., Mich., N. Y., N. J., Fla.

**Bassareus formosus** Fabr.\* et var. *sulphuripennis* Melsh.\* Ill., Mich., N. J., Pa., Ga.

**Bassareus detritus** Oliv.\* Can., "Atlantic States."

**Bassareus mammifer** var. *sellatus* Suffr. Can., Iowa, Mich., Ohio, N. J., Middle and Western States.

**Cryptocephalus 4-maculatus** var. *notatus* Fabr.\* Kans., Nebr., Iowa, Can., Mich., Ohio, Vt., N. J.

**Pachybrachys hepaticus** Melsh. Kans., Nebr., Ariz., Fla., Colo., (Ckll.) Mich., Ohio, "Atlantic and Pacific Regions" (Lec.).

**Pachybrachys** sp. aff. *atomarius* Melsh.

**Diachus auratus** Fabr. Oreg., Cal., Mts. of Ariz., Texas, Baja Cal., Can., Van. Isl., Rocky Mts. of Colo., Mich., Ohio, N. Y., Utah, Fla., N. J.

**Diachus catarius** Suffr. Can., Mich., Van. Isl., Ill., Ga.

**Adoxus obscurus** Linn., var. *vitis* Fabr. Cal. and Nev., (form *obscurus*) more rare eastward. The form *vitis* occurs in Wash., Colo., Utah, eastward to N. H., (Mt. Wash.), Alaska, Europe, Northern Asia.

- Chrysochus auratus** Fabr.\* Can. to N. J. and southward, Colo., Kans., Dak., Ariz.
- Graphops pubescens** Melsh. Mass. to Georgia, Iowa and Texas; Canada, N. J.
- Colaspis brunnea** Fabr.\* "Entire region east of Rocky Mountains, extending to Arizona" (Horn). Canada.
- Prasocuris varipes** Cr. Mich., Vt., N. Y., N. J.
- Doryphora 10-lineata** Say. New Mex., Colo., Kans., Nebr., Iowa, Can., Mich., Ohio, Vt., N. Y., N. J.
- Chrysomela elegans** Oliv. Wyo., Can., Ohio, Iowa, Mich., Vt., N. Y., Nova Scotia, N. J., Oreg.
- Chrysomela scalaris** Lec. Kans., Nebr., Iowa, Ohio, Mich., Vt., N. Y., Fla., N. J.
- Chrysomela multipunctata** Say. Cal., Nev., Kans., Nebr., Can., Colo., (7,000–8,000 ft.) Ohio, Vt., N. Y., N. J., Iowa.
- Chrysomela philadelphica** Linn. Kans., Nebr., Can., Mich., N. Y., N. J.
- Plagioderma viridis** Melsh.\* Can., Iowa, Vt., N. Y., Fla., N. J.
- Gastroidea polygona** Linn.\* Can., Iowa, Mich., Ohio, Vt., Nova Scotia, N. Y., N. J.; also in Europe and Asia.
- Lina lapponica** Linn. Can., Alaska, Hud. Bay, Atlantic and Pacific Regions of U. S. Also found in Siberia, China and Europe.
- Gonioctena pallida** Linn. Minn., Hud. Bay, Lake Superior Region in general; also Europe and Siberia.
- Phyllodecta vulgatissima** Linn. Can., Iowa, Mich., N. Y., Pa., Ohio, perhaps in Alaska; Mt. Wash., (N. H.), N. J. Also in Europe and Asia.
- Phyllobrotica decorata** Say. Ill., Colo., Can., Iowa, Mich., N. Y.
- Diabrotica 12-punctata** Fabr. Canada to Texas and eastward; extending into Arizona and Southern California on the west.
- Trirhabda canadensis** Kirby. Hud. Bay Region, Can., Kans., N. J., Nebr., Colo., Utah, Cal., Iowa, Mich., N. Y.
- Galeruca cavicollis** Lec.\* Can., New England, Pa., N. C., N. Y.
- Galeruca decora** Say. Can., Mass., Iowa, N. Y., Colo. This distribution is that of the pale form to which my specimens belong. Black ones occur farther west.

- Oedionychis limbalis** Melsh.\* Can., Iowa, N. Y., N. J., Mass., Ga., Texas.
- Disonycha pensylvanica** Ill.\* Can., N. H., Iowa, Mich., N. J., N. Y., all over U. S.
- Disonycha 5-vittata** Say. Baja Cal., Colo., New Mex., Nebr., Kans., Can., Iowa, Mich., Ohio, entire region west of Miss.
- Haltica bimarginata** Say. Nebr., Kans., Iowa, Can., Colo., Cal., Mich., N. J., Texas, Alaska to Mexico.
- Haltica ignita** Ill. Baja Cal., Can., Iowa, N. J., Hudson's Bay to New England, south to Texas and Florida.
- Crepidodera helxines** Linn. B. C., Van. Isl., Oreg., Wash., Colo., Idaho, Nebr., Kans., Can., N. H., Iowa, Mich., Ohio, Vt., Fla., N. Y., N. J.; also in Europe and Siberia.
- Crepidodera modeeri** Linn. Mich., Can., Oreg., Cal., Kans., Europe, Siberia.
- Systema frontalis** Fabr. Can., Iowa, Mich., Vt., N. Y., Fla., N. J., entire region east of Rocky Mountains.
- Longitarsus turbatus** Horn.\* Ill., Ala., Mich., Texas.
- Glyptina brunnea** Horn.\* Ga., La., Texas, Wis.
- Chætocnema irregularis** Lec.\* Colo., (8,000-9,400 ft.) Cal., Oreg., Nev., Mich.
- Chætocnema protensa** Lec.\* Colo., (7,000-9,200 ft.) Mich., Maryland.
- Psylliodes punctulata** Melsh. Can., Iowa, Mich., N. Y., N. J., Mass., Wash., Van. Isl., Cal., Nev., Utah, Kans., Colo., Texas.
- Odontota nervosa** Panz. Nebr., Kans., Can., Iowa, Mich., Ohio, N. Y., Fla., N. J., Texas.
- Chelymorpha argus** Licht.\* Can., Iowa, Ohio, N. Y., Colo., Fla., N. J., Eastern U. S. in general.

## TENEBRIONIDÆ.

- Nyctobates pensylvanicus** De Geer.\* New Mex., Kans., Nebr., Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., "Northern and Middle States to California."
- Iphthimus opacus** Lec. Can., Ohio, Nova Scotia, New England.

- > **Upis ceramoides** Linn. Can., Mt. Wash., (N. H.), Mich., Vt., N. Y., Nova Scotia, N. J., Mont., Hud. Bay, Pa., Maine, Manitoba, Europe and Northern Asia.
- Xylopinus saperdioides** Oliv.\* Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., Va.
- Tenebrio molitor** Linn.\* Can., Alaska, U. S. generally, near or in houses. Cosmopolitan; distributed by commerce.
- Tenebrio tenebrioides** Beauv.\* Kans., Neb., Can., Iowa, Mich., Ohio, Vt., N. Y., Fla. N. J. "abundant over our whole territory" (Horn).
- Paratenetus fuscus** Lec. Can., Colo., (Ckll.) Iowa, Ohio, Vt., N. J., "States bordering the Great Lakes" (Horn).
- Blapstines interruptus** Say. Kans., Nebr., Can., Iowa, Mich., N. Y., N. J., Minn., Colo., Wyo.
- Diaperis hydni** Fabr.\* Kans., Nebr., Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., Va.
- Platydemia excavatum** Say.\* Kans., Nebr., Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., "entire district east of Rocky Mountains" (Horn).
- Platydemia americanum** Lap. Can., Iowa, Mich., Ohio, N. Y., Vt., N. J., Va.
- Hypophloeus parallelus** Melsh. Can., Colo., (9,400 ft.) Mich., N. Y., N. J., Ariz.
- Boletotherus bifurcus** Fabr. Kans., Nebr., Can., Iowa, Mich., Ohio, Vt., N. Y., Fla., N. J., Va.
- Boletothagus corticola** Say. Can., Mich., Vt., N. Y., N. J.
- Boletothagus depressus** Rand. Can., Ohio, Vt., N. Y., N. J.

## CISTELIDÆ.

- Androchirus erythropus** Kirby.\* Can., Mich.
- Mycetochara binotata** Say. Can., Mich., N. Y.
- Mycetochara bicolor** Coup. Can.
- Isomira sericea** Say.\* New Mex., (Leconte) Mich., Ohio, N. Y., N. J., Mass., N. C.
- Hymenorus niger** Melsh. Can., Mich., Ohio, N. Y., Pa., Fla., Texas.

**Hymenorus pilosus** Melsh. Can., Iowa, Mich., Ohio, Mass., Va.

MELANDRYIDÆ.

**Penthe obliquata** Fabr. Can., Iowa, Mich., Ohio, Vt., N. Y., N. J.

**Synchroa punctata** Newm. Can., Iowa, Mich., Ohio, Vt., Fla., N. Y., N. J.

**Scotochroa atra** Lec. Can., Mt. Wash., (N. H.).

**Serropalpus barbatus** Schall. Can., Alaska, B. C., Hud. Bay, Oreg., Maine, Rocky Mountains, south to New Mex., N. Y., Vt. Also in Siberia and Europe.

**Mystaxis simulator** Newm.\* Mich., Ohio, Vt., N. Y., N. J.

**Marolia fulminans** Lec.\* Oreg., Can.

**Hypulus lituratus** Lec. Can., Iowa, Mich., Ohio, Vt., N. Y., Va., Missouri.

**Symphora flavicollis** Hald. Can., Iowa, Mich., Ohio.

**Eustrophus repandus** Horn.\* Can., Iowa, Mich., "New Hampshire and Virginia, to Pacific Coast as far south as the extreme north of California" (Horn).

**Hallomenus punctulatus** Lec

**Orchesia castanea** Melsh.\* Can., Mt. Wash., (N. H.), Mich., Iowa, Ohio, N. Y., N. J.

**Canifa pallipes** Melsh.\* Kans., Nebr., Can., Mt. Wash., (N. H.), Colo., (7,000 ft.,) Mich., Ohio, N. J.

PYTHIDÆ

**Crymodes discicollis** Lec. Can., Man., Colo., (Ckll.).

**Pytho americanus** Kirby. Pa., Can., N. Y., Mich., Ohio, Kans., Mts. of N. C., N. J. Dr. Hamilton thinks it the same as the European *P. depressus* Linn.

CEDEMERIDÆ.

**Asclera ruficollis** Say. Can., Iowa, Mich., Ohio, N. Y., N. J.

**Asclera puncticollis** Say. Can., Iowa, Mich., Ohio, N. Y.

CEPHALOIDÆ.

**Cephaloon lepturides** Newm. Can., Mt. Wash., (N. H.), Ohio, N. Y., N. J.

## MORDELLIDÆ.

- Anaspis nigra** Hald. Can., Mt. Wash., (N. H.), Colo., (8,000 ft.),  
Hud. Bay, N. Y.
- Anaspis flavipennis** Hald. Can., Mt. Wash., (N. H.), Mich., Ga.,  
N. Y., Minn.
- Anaspis rufa** Say. "Can. to Alaska and Tex.," Baja Cal., Colo.,  
Mich., Ohio, Vt., N. Y., Utah, Fla., N. J.
- Mordella scutellaris** Fabr. Baja Cal., Can., N. H., Iowa, Colo.,  
Mich., Ohio, Vt., N. Y., Fla., N. J., Cal.
- Mordella borealis** Lec. Can., Northern States.
- Mordellistena biplagiata** Helm.\* Ohio, Ill., N. Y. ✓
- Mordellistena limbalis** Melsh.\* Can., Iowa, Ohio, N. Y., N. J.,  
Middle States.
- Mordellistena comata** Lec.\* Can., Iowa, Mich., Ohio, N. Y.,  
N. J., U. S. generally.
- Mordellistena tosta** Lec. Can., Mich., Ohio, Ga., N. Y.
- Mordellistena unicolor** Lec.\* Can., Iowa, Colo., (7,000-8,000 ft.),  
Ohio, N. J., U. S. in general.

## ANTHICIDÆ.

- Corphyra lugubris** Say. Can., Iowa, Mich., Ohio, N. Y., Wyo.
- Notoxus anchora** Hentz. Kans., Nebr., Can., Colo., Iowa, Vt.,  
Mich., N. Y., N. J.
- Anthicus floralis** Linn. Can., Iowa, Mich., Ohio, N. Y., N. J.;  
said to be cosmopolitan.
- Anthicus coracinus** Lec. Can., Mich.
- Anthicus cervinus** Laf. Kans., Nebr., Can., Iowa, Mich., Ohio,  
N. Y., Utah, N. J.
- Anthicus spretus** Lec. (pale race). Can., Iowa, Mich., N. J.
- Anthicus pallens** Lec. Mich., Fla., N. J.

## PYROCHROIDÆ.

- Pyrochroa flabellata** Fabr.\* Can., Iowa, Mich., Ohio, N. J., Vt.,  
New York.

**Dendroides bicolor** Newm. Can., Iowa, Mich., Ohio, Vt., N. Y., N. J., Fla.

**Dendroides concolor** Newm. Can., Mt. Wash., (N. H.), Mich., Ohio, N. Y.

MELOIDÆ.

**Macrobasis unicolor** Kirby. Very injurious to potatoes at Bayfield. Can., Iowa, Colo., Mich., N. Y.; Eastern U. S. generally, west as far as Colo., south to Florida.

RHINOMACERIDÆ.

**Rhinomacer elongatus** Lec. Can., Pa.

RHYNCHITIDÆ.

**Rhynchites cyanellus** Lec. Can., Mich., Mass., Ill.

ATTELABIDÆ.

**Attelabus bipustulatus** Fabr. Can., N. Y., Va., "Atlantic States."

**Attelabus rhois** Boh. Can., Iowa, Mich., N. J., south to Va.

OTIORHYNCHIDÆ.

**Hormorus undulatus** Uhler. Can., Iowa, Mich., N. Y., N. J., Md., Ill., Dakota.

**Geoderces melanothrix** Kirby. Canada, New York.

CURCULIONIDÆ.

**Sitones flavescens** Marsh. Can., Iowa, Mich., Ohio, N. Y., N. J., Pa., Fla., Ind., Ill., Nova Scotia, Europe, Asia, North Africa.

**Apion segnipes** Say.\* Can., New Mex., N. J., Western and Southern States.

**Apion** sp. aff. *cavifrons* Lec.\*

**Phytonomus punctatus** Fabr.\* Can., N. Y., N. J., Pa., Ohio, Ind., W. Va., Europe, Asia, North Africa.

**Lepyrus geminatus** Say. Kans., Nebr., Can., Van. Isl., Colo., (8,000 ft.,) Mich., N. Y., "Ill. to Colo."

**Listronotus callosus** Lec.\* Iowa, Mich., N. J., "N. Y., to Ga."

**Listronotus caudatus** Say.\* Can., Iowa, Mich., N. Y.

**Listronotus latiusculus** Boh. Can., Iowa, Mich., Ohio, N. J.,  
"Middle and Southern States."

**Macrops** sp.

**Pissodes strobi** Peck. Can., Mich., N. Y., N. J., "Lake Superior  
to Georgia."

**Pissodes dubius** Rand.\* Can., Mt. Wash., (N. H.).

**Hylobius confusus** Kirby. Can., Alaska, Mich., N. Y., Mass.

**Hypomolyx pineti** Fabr. Mich., Can., Hud. Bay, Europe and ✓  
Siberia.

**Lixus caudifer** Lec.\* Ill., B. C.

**Dorytomus laticollis** Lec. Can., Iowa, Mich., N. Y., N. J.

**Dorytomus brevicollis** Lec. Can., Van. Isl., Mich., N. Y., N. J.

**Dorytomus** sp. incog.

**Bagous mammillatus** Say. Mich., Fla., "Southern and Western  
States."

**Magdalis pandura** Say.\* Can., Iowa, Mich., Ohio, N. Y., N. J.,  
Pa., Ga., Mo.

**Magdalis inconspicua** Horn.\* Can., Colo., (7,600 ft.) Mich.,  
Pa., N. Y.

**Tachypterus quadrigibbus** Say.\* Can., Iowa, Mich., Ohio, Ill.,  
N. Y., N. J., Mass., Texas, Cal. "Occurs probably over our en-  
tire territory" (Dietz).

**Anthonomus signatus** Say. Can., Mich., Ohio, N. J., "Mass.  
to Fla. and Texas."

**Anthonomus scutellatus** Gyll. Iowa, Mich., Ohio, N. J., Mo.,  
Mass., Texas.

**Anthonomus rufipennis** Lec. Colo., (8,000 ft.) Mich., Texas,  
Pa., Florida.

**Orchestes rufipes** Linn.\* Can., Colo., (Ckll.) (7,000-9,200 ft.,  
Sz.) N. Y., Vt., Cal.

**Orchestes niger** Horn.\* Colo., (7,000-9,200 ft.) Mich., Ohio, Ill.,  
N. Y., N. J., Can., Nova Scotia, Pa.

**Orchestes canus** Horn.\* Ohio, Mich., Colo.

**Elleschus bipunctatus** Linn. Can., N. J., Mich., Europe.

- Piazorhinus scutellaris** Say. Kans., Nebr., Can., Iowa, Mich., Ohio, N. Y., N. J., Atlantic States.
- Piazorhinus pictus** Lec.\* Beaten from oaks. Can., Fla., N. J., Ill., Georgia.
- Conotrachelus nenuphar** Hbst.\* Can., Iowa, Mich., Ohio, N. Y., N. J., Atlantic Slope generally.
- Rhyssomatus palmarum** Say.\* Can., Ohio, Fla., Mo., N. Y., Texas.
- Mononychus vulpeculus** Fabr.\* Iowa, Mich., N. Y., Ind., N. J., "Canada to Georgia."
- Cnemogonus epilobii** Payk. Slave Lake and B. C.; also in Europe.
- Cœliodes acephalus** Say.\* Mich., Ohio, N. Y., N. J., "Middle and Western States."
- Balaninus nasicus** Say.\* Can., Iowa, Mich., Ohio, N. Y., N. J., Ga., Kans., Pa., Ill.

## BRENTHIDÆ.

- Eupsalis minuta** Drury. Can., Iowa, Mich., Ohio, N. Y., Texas, Fla., N. J.; "abundant from Lake Superior to Texas, and from New England to Colorado."

## CALANDRIDÆ.

- Sphenophorus costipennis** Horn. Can., Iowa, Mich., N. J., Ill., Nev., Manitoba.
- Dryophthorus corticalis** Say. Can., Iowa, Mich., Ky, N. Y., Fla., N. J., "Atlantic district generally."
- 7 **Cossonus subareatus** Boh. Kans., Nebr., Iowa, "Middle States," (Horn).
- Rhyncolus brunneus** Mann. Can., Alaska, Van. Isl., So. Cal., New Mex., Vt., N. H., N. J.

## SCOLYTIDÆ.

- Pityophthorus materiarius** Fitch. Can., Mich., N. Y., Fla., "Can. to Texas."
- Pityophthorus minutissimus** Lec.\* Iowa, Mich., N. J., "Middle and Southern States."

**Pityophthorus** sp. incog.

**Xyleborus cælatus** Esch. Iowa, Colo., Mich., Ohio, N. Y., N. J.,  
"Can. to Texas and Cal."

**Xyleborus** sp. incog.

**Tomicus pini** Say. Kans., Nebr., New Mex., Can., Mich., N. Y.,  
Colo., N. J., Hud. Bay.

**Phlæosinus dentatus** Say. Can., N. J., "Middle and Eastern  
States."

**Dendroctonus terebrans** Oliv. Colo., Cal., Can., N. Y., Mass.,  
Fla., N. J., Ga., Oreg., Wash., Ariz., Idaho, New Mex., Nev.,  
Md., Pa.

**Hylurgops pinifex** Fitch. Can., Mich., N. Y., N. J., Ohio, Pa.,  
W. Va., Queen Charlotte Islands. Also in Europe and Siberia.  
(*H. glabratus* Zett.) Hamilton.

ANTHRIBIDÆ.

**Gonotropis gibbosus** Lec. Can., Colo.

**Allandrus bifasciatus** Lec. Can., Colo., (8,000 ft.) N. Y., N. J.,  
Illinois.

**Hormiscus saltator** Lec. Can., Mich., Ohio, N. Y., N. J., "Mid-  
dle and Western States."

## STONE MOUNDS AND SERPENT OF HUGHES COUNTY, SOUTH DAKOTA.

BY JOHN M. HELMICK.

IN the spring of 1883 a business trip took me to Blunt, a small town in the northern part of Hughes County, South Dakota. The town was then in its infancy. It is nicely located in a wide valley and almost surrounded by high hills. The group of hills at the south-west is called "Medicine Knolls." The highest one of these rises some 800 to 1,000 feet above the level of the valley and is distant some  $3\frac{1}{2}$  miles from the town. I wandered out to this group of hills in quest of jack-rabbits, and curiosity tempted me to ascend to the top of this highest knoll. There is no timber on these hills—only a few small bushes in the ravines. Grass and small herbs compose the only vegetation on the sides and top of the hills, which are composed of light soil, gravel, and boulders of all sizes. No mass or stratified rocks appear. The summit of this highest knoll comprises an area of some three acres in extent. On reaching this my attention was at once directed to three stone mounds, marked a, b, and c, and a small one, d. (See cut.) I at once advanced to mound a, then to d, and then to c. I then retraced my steps towards a, and when near mound b I crossed a line of stones, the curve of which I followed some distance, when I noticed a parallel line. I immediately retraced my steps, following the double line of stones toward mound c, and until the lines converged at the tail. I then returned toward mound a, thinking I was following a serpentine walk among the altars. As I approached mound e the lines again converged until near this mound, at which point I was surprised and delighted to behold at their terminus a large and well-formed head of a serpent. I had followed the outline of a large serpent, and not a causeway, as I had at first suspected.

I paced the distance between these mounds and estimated the distance from a to c at 300 feet. If the serpent were straight it would about span this distance. I noted my estimates and made a sketch of location, and entered these in my journal on returning to Blunt.

The stones of which this serpent is composed average 50 pounds in weight. They are placed about a foot apart in the lines, and the lines

are some five or six feet apart in the middle of the body and converge toward either extremity. The neck is two feet wide; the head, five feet. There are two stones representing eyes. The head is directed to the north-west. The stones are deeply imbedded in the ground, which is composed of sand and gravel and a light mould. After the grass begins to grow they would not be noticed except on close inspection.

The mounds a, b, and c are some ten feet in diameter and three feet high, and are composed of boulders of various sizes up to 100 pounds



or more in weight. Mound c had been disturbed, about half of the north side being torn away—evidently by some one exploring its contents. The others seemed to be undisturbed. Old grass was still clinging to the scanty soil between the stones. The small mound, d, similarly constructed, was not more than half the dimensions of the larger ones. There was no appearance of recent handling about these stones, no ashes visible, and the stones forming the serpent being

deeply imbedded in the ground, all indicated that these works were ancient. The stones were probably gathered from the level area on which the works are located, for this area is free from other stones, whereas the sides of the knoll, and the summits and sides of the others are strewn with similar boulders.

There are many small circles (marked e) scattered about these works. They are some ten to twelve feet in diameter, formed of stones a foot apart. There were still many modern Indians in this vicinity—Winnebagoes, Crows, and Sioux. I enquired of a Crow and a Sioux, and each denied knowledge of the existence of the mounds. At Blunt I enquired of an attorney, Mr. Charles Berger, who also said he knew nothing of such works and expressed surprise at their existence. I believe I am the first white man who ever saw the serpent. It would not be visible from the time the grass is a few inches high until after it was burned over, except on close inspection. I visited the knoll at the most favorable time for seeing the colossal serpent, remarkable in itself, and especially as being the only one known constructed of stone in the manner described.

This entire knoll is useless for agricultural purposes, and should be preserved as a park. It will exist for centuries as it is to-day if it escapes the hands of the willful vandal.

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NOTE.--Since writing the above I have seen the article on this subject in *American Anthropologist*, Vol. II., No. 2. My notes were written on the spot, April 25, 1883, and I believe them correct. I used a compass in noting direction. Height of butte estimated.

J. M. H.

## A SHELL GORGET FROM MEXICO.

BY FREDERICK STARR, PH. D.

NO CLASS of objects from our southern mounds are more beautiful and interesting than the engraved shell gorgets. They were first seriously discussed and adequately illustrated by W. H. Holmes in his paper — *Art in Shell of the Ancient Americans*. \* These objects are thin, nearly circular, concavo-convex plates of shell, carefully smoothed on both surfaces and engraved upon the concave side. The shell which usually supplied the material was *Busycon perversum*, which is common along the Atlantic and Gulf coasts from Massachusetts to Mexico. The form of the shell and the quality of its material are such as to make the securing of flat plates of any size quite impossible; hence the concavo-convex form of the sides is a result inherent in the material itself. The designs engraved upon the concave surface are surprisingly well done. While they are clearly ornamental they are no less clearly symbolical as well. The types are comparatively few and the treatment is notably conventional. Holmes grouped these designs into a few classes—the cross, scalloped disk, birds' head and coil, serpent, spider, human face and human figure. These gorgets, which measure from  $2\frac{1}{2}$  to 5 inches in diameter, were worn as ornaments, probably suspended from the neck and hanging down upon the breast. Two holes for suspension are usually found near the upper edge, and, not infrequently, show marks of wearing due to the suspension cord. The specimens have come from stone graves and mounds in Tennessee, Missouri, Illinois, Georgia, and other southern states. Everywhere in art and function they embody one well-defined conception and are plainly related.

The most interesting are certainly those upon which is represented the human figure. Of such Mr. Holmes describes four. After his paper was printed, fragments of two others were found in one of the Etowah group of mounds in Georgia, by Mr. Rogan. These were illustrated in Cyrus Thomas' paper, *Burial Mounds of the Northern Sections of the United States*. † Still later Gates P. Thruston, in his *Antiquities of Tennessee*, reproduced all these figures, and added a

\* Sec. An. Rept. Bureau of Ethnol., pp. 179-305.

† Fifth An. Rept. Bureau of Ethnol., pp. 103-104.

description and illustration of a curious specimen belonging to A. E. Douglass, of New York City. There are thus seven of these southern gorgets, bearing representations of human figures, illustrations of which are easily accessible to the student. No two of these are exactly alike. It is not necessary here to redescribe them, but a few points regarding each need emphasis:

(a). A curious piece, whereon the human figure is so crudely and conventionally represented that great pains are necessary to detect it at all, in what at first sight looks like a meaningless combination of lines. The joints of the arms and legs are quite unanatomical, and the feet are developed into single, well-defined talons or claws which fold upward against the knee. Perforations, from one-fourth to one-sixteenth of an inch in diameter, occur at several places, particularly at joints of the figure and at the junction of two or more lines. There are twenty-six of these. Tennessee.

(b). The same general idea occurs here, but the human figure is more easily recognized. The arms are curiously jointed; the hands are well defined. There are plume-like appendages along the arms and legs. The feet are developed into single claws. From the mouth, which is well supplied with teeth, there is a nondescript appendage, "which may be part of the costume, or, since it issues from the mouth, may possibly symbolize speech." There are five perforations, including the suspension holes. Tennessee.

(c). A sacrificial scene. An upright figure in profile, decked with ornaments. With arms extended, he is advancing. Before him he holds a severed human head with face downward. His head is large, occupying one-third the height of the whole figure. The face is tattooed diagonally across the face from below the eye to below the ear. The pupil of the eye is indicated by a pit-like depression. A peculiar apron-like object hangs from a belt at the waist, and a fan-like extension of the costume, somewhat like a bird's tail, descends between the legs. A peculiar object projects from the mouth. The severed head presents face tattoo marks and the curious mouth object. Missouri.

(d). Fragmentary. A remarkable piece of work. Two human figures, plumed, winged, and with feet like those of eagles are represented in profile, facing, and engaged in deadly combat. The great wings and the many feathered tails are notable. Tennessee.

(e). Fragmentary. Two figures, one erect the other prostrate. Both are tattooed. The victor has a zigzag line running from the root of the nose across the cheek to the neck; the other is marked

with a zigzag line from the hair over the temples vertically down the face. Both wear large ear-rings, and *appear* to have the curious mouth object. Georgia.

(f). Fragmentary. Winged figure kneeling. The nose is eagle-beaked. There is a peculiar tatoo (?) about the mouth. There is an object before the mouth somewhat like those already described, but *not* actually connected with it. It appears, however, to be attached to the head-dress. There is a belt and pendent at the waist. Georgia.



(g). The Douglass tablet from Missouri presents little of great significance for our comparison. Through Gen. Thruston's politeness it is here reproduced. Notice the belt and the suspended apron.

Of this gorget General Thruston says : \*

"The very peculiar skirt or appendage hanging to the waist-belt appears in both the copper-plate figures from the Etowah mound, which had not

\* Antiquities of Tennessee, p. 346.

been published in 1887 when this shell gorget was discovered. The curious complicated head-dress and long hair-tie, also suggest the Georgia figures, as does the long implement or object under the right arm, which appears to be a duplicate of the object held in the right hand of the copper-plate figure. The fan-shaped scarf hanging from the waist, appears in several of these designs. The ear-ring, the breast ornament, the large beads upon the wrists and legs, the half-circles on the arms and lips, all suggest analogies."

With the pictures of these gorgets before him, anyone at all acquainted with Mexican art must notice curious analogies. Holmes recognized similarity. Of the scalloped disks he says:

"The student will hardly fail to notice the resemblance of these disks to the calendars of Mexico and other southern nations of antiquity. There is, however, no absolute identity with southern examples. The involute design in the centre resembles the Aztec symbol of day, but is peculiar in its division into three parts, four being the number almost universally used." Holmes, l. c. p. 279.

Of the bird pattern and loop pattern he remarks:

"A similar looped rectangle occurs several times in the ancient Mexican manuscripts. \* \* \* \* It is not a little remarkable that a cross occupies the enclosed area in all these examples." Holmes, l. c. p. 285.

"\* \* \* Gorgets of shell are a marked characteristic of the personal embellishment of the northern peoples. They may have been in use among the Aztecs, but do not appear among southern antiquities, and no evidence can be derived from history. This gorget belongs, in its general character as an ornament, to the north. \* \* \* \* In all these features, together with its technical execution and its manner of inhumation, it is identical with the well-known work of the mound-builders. These analogies could hardly occur if it were an exotic. It is true, however, \* \* \* \* that the design itself has a closer affinity to Mexican art than to that of the north. \* \* \* \* As an ornament, this Missouri gorget is a member of a great family that is peculiarly northern, but the design engraved upon it affiliates with the art of Mexico, and so close and striking are the resemblances, that accident cannot account for them, and we are forced to the conclusion that it must be the offspring of the same beliefs and customs and the same culture as the art of Mexico." Holmes, l. c. 305.

We have now to describe another engraved gorget of shell on which a human figure is represented. The specimen is part of the Ryerson collection, now at the University of Chicago. It was collected near Morelia, in the state of Michoacan, Mexico, by Abadiano, probably in the year 1882. It is remarkably well preserved and has been somewhat cleaned, but of its authenticity there is absolutely no question. As the United States specimens it is a thin, concavo-convex plate. The inner, concave face, is the one carved. The gorget is nearly circular measuring 106 mm. in height and 100 mm. in breadth.

In thickness it measures from 3 to 4<sup>mm</sup>. In the catalogue of the collection the design is said to represent "a warrior seated and speaking." The cut here given reproduces the object admirably. The carved figure occupies a roughly circular space at the centre of the gorget. A narrow plain band surrounds this; outside of it is a broader band occupied by six flattened circular ones inclosing a smaller circle surrounding a pit-like depression, alternating with six ornamental mo-



tives of uncertain significance. In this band much of the shell between these designs (represented in black in the illustration) has been cut entirely out. Twenty-four such open spaces occur in this band. Outside of all is a narrower plain band. The engraved design itself represents a warrior seated. His head is surmounted by a head-dress. The hair is well drawn; the eye is represented by an ellipse sharpened at one end with a pit-like depression for the pupil. A great ear ornament is represented with a central depression. The nose is large and connected with it is a curious mark, which may be tattooing or a

nose skewer. A zigzag tatoo line runs from below the nose across the cheek to the ear. The mouth is open, the teeth of the upper jaw are indicated and a curious object projects from the mouth. The body is curiously stiff and formal. The arms are extended and the left hand grasps some object. The right one (somewhat distorted in the cut) projects beyond it to the very border of the design. The legs are extended forward. The foot is claw-like. Plumes are attached to the arms and legs. Part of a rectangular object, apparently a belt, is seen and from it in front an apron-like pendent apparently projects, while, if I mistake not, a tail-like appendage hangs down below the figure, apparently after having passed between the legs. What appears to be a shield with a downward hanging fringe of plumes is on the warrior's back and over it is an object which resembles somewhat a war club although it may be an *atlatl* or spear-thrower. At several places within the design are pit-like cavities sometimes surrounded by circles. There are ten apertures cut through the shell within this area.

Many points of similarity might be found between this design and those from the United States. The stiff and formal trunk may be compared with those of (a) and (b). The clawlike foot recalls the Tennessean specimens. The curious object at the mouth is apparently in nature like that in (b), (c), and (e). The curious perforations are present in several. Tatoo markings are the rule in these designs but those on the Mexican specimens and the Georgian piece (e) are almost identical. The belt and curious apron-like projections are comparable with those in (c) and (g).

The finding of such an object in the heart of Mexico is of much interest. Form, function, character of this Michoacan specimen are plainly the same as those of the pieces from Tennessee, Georgia, and Missouri. It can no longer be said that the type is essentially northern nor that it belongs exclusively to the "Mound-builders" of the United States. We must modify Mr. Holmes' statement and may say of the Missouri gorget (c) — "it is a member of a great family, *not* peculiarly northern." We may emphasize this other statement — "*the design upon it affiliates with the art of Mexico and so close and striking are the resemblances that accident cannot account for them, and we are forced to the conclusion that it must be the offspring of the same beliefs and customs and the same culture as the art of Mexico.*" In fact there are greater differences between the Tennessee specimens themselves, or between the Missouri specimens alone, than there are between the United States specimens, as a class, and this Mexican gorget.

## REVISION OF THE TRUXALINÆ OF NORTH AMERICA.

(Read before the Academy, November 29th, 1895.)

BY JEROME McNEILL.

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It is proper to state that this paper is based largely upon the material of the United States National Museum, to whose officers I am much indebted for the generosity with which the collection was placed at my disposal for study during the three months which I was able to spend in Washington. For these and other favors I am deeply indebted to Dr. C. V. Riley and Dr. L. O. Howard. Dr. S. H. Scudder has placed me under great obligations by sending me many of the rare and sometimes unique specimens of his less-known species. I have also received help in the way of types and other specimens, as well as valuable notes, from Prof. R. S. Morse, which I gratefully acknowledge. I am indebted to the kindness of Mr. Coquillett for valuable notes on his very interesting collection of *Orthoptera* made in Southern California and now included in the collection of the National Museum. Finally, I owe to the generosity of Mr. Ashmead the possession of a small but valuable collection of *Orthoptera* from Florida.

My own collection of *Orthoptera* contains all the species of the *Truxalinæ* found west of the Alleghenies, east of the great plains, and north of Texas and Florida and a large portion of the other species of North America outside of Mexico and Central America. I regret extremely that I have not been able to see more of the Mexican species of Saussure and Walker, but the types are not easily accessible and without them the often meagre descriptions are insufficient for the certain determination of their species. With the single exception of *Alpha*, I have not accepted the genera proposed by Brunner in his excellent *Révision du Système des Orthoptères*. The brief descriptions given in his key and the failure to name the species (except in the case noted above) upon which his genera were founded, together with the fact that many Mexican forms were unknown to him, have made it impossible to satisfactorily identify these genera.

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The *Truxalinæ* constitute a sub-family of *Acridida*. They are more closely related to *Ædipodina* than to any other group of equal rank,

and though they present on the whole a very different appearance and, in fact, are different in a large number of characters from *Ædipodinae*, the connecting links between them are so numerous that it is difficult to find any clearly definable characters which will serve to separate these sub-families.

KEY TO THE AMERICAN SUB-FAMILIES OF ACRIDIDÆ.

- A.<sup>1</sup> Tarsi not furnished with a pulvillus. Pronotum extending to or beyond the end of the abdomen. . . . . 1.—*Tettiginae*.
- A.<sup>2</sup> Tarsi furnished very generally with a pulvillus. Pronotum much exceeded by the abdomen.
- B.<sup>1</sup> Antennæ shorter than the anterior femora. . . . . 2.—*Proscopinae*.
- B.<sup>2</sup> Antennæ longer than the anterior femora.
- C.<sup>1</sup> Prosternum unarmed or, if furnished with a more or less distinct tubercle or spine, the lateral carinæ of the pronotum or the lateral foveolæ of the vertex are present and well developed.
- D.<sup>1</sup> Vertex of the head generally horizontal or a little ascending. Viewed from the side, the vertex forms an angle, more or less rounded, with the front, which is very generally moderately or strongly oblique. In no case is the median carina of the pronotum crested or cut by more than one sulcus and the posterior margin of the metazone is never sharply angulate. . . . 3.—*Truxalinae*.
- D.<sup>2</sup> Vertex of the head very generally declivent. Viewed from the side, the vertex is nearly always roundly and not angulately united with the front, which is sub-perpendicular, rarely decidedly oblique. In the rare cases where the head is truxaline, the pronotum and the tegmina are strongly ædipodine, *i. e.*, the lateral carinæ are obsolete, the median carina is cut by more than one incision or is crested, or the metazone is sharply angulate and the tegminæ are everywhere densely and regularly reticulate. . . . . 4.—*Ædipodinae*.
- C.<sup>2</sup> Prosternum armed with a tubercle or spine.
- D.<sup>1</sup> Front very oblique. Lateral foveolæ meeting in the median line so as to form the anterior part of the roof of the vertex. . . . . 5.—*Pyrgomorphinae*.
- D.<sup>2</sup> Front rarely very oblique, frequently sub-perpendicular. Lateral foveolæ, if present, never meeting nor forming a part of the roof of the vertex. . . . . 6.—*Acridinae*.

The following comparison may help to show that in spite of the difficulty of separating these sub-families there are really very distinct truxaline and œdipodine characters of the head, the pronotum, the tegmina, and the wings. Unfortunately, for classification, a truxaline head does not always go with truxaline pronotum and tegmina. It will usually be found, however, that when one set of characters are strongly presented in one part the opposite set will be no less strongly indicated in the other two regions. Thus while *Acrolophitus* and *Machaerocera* have truxaline heads, they have the typical œdipodine pronotum, tegmina and wings. I have, accordingly, on account of the preponderance of the last mentioned characters followed Dr. Scudder in excluding these and allied forms from the sub-family under discussion. *Boopedon*, on the other hand, has an œdipodine head, but it too has the characters of the head reversed in the pronotum, tegmina, and wings. There still remain certain genera, as *Psolocessa*, *Stirapleura*, *Aulocara*, and their allies, in which the opposing characters of these two sub-families are so evenly blended that in the end it is a somewhat arbitrary line that divides the *Truxalinæ* from the *Edipodinæ*. I hope, however, that the character I have chosen (the presence of but one transverse incision which cuts the median carina) will not prove altogether unnatural. In accordance with this character I have removed *Psolocessa*, *Stirapleura* and some allied forms, as well as one species of the genus, *Aulocara*, from the *Edipodinæ* and included them in the *Truxalinæ*.

## CHARACTERS OF THE HEAD.

## TRUXALINÆ.

- 1.—Vertex horizontal or ascending and, when seen from the side, this and the face form an angle rather than a regular curve.
- 2.—The front is decidedly oblique.
- 3.—The lateral foveolæ are frequently absent or invisible from above.
- 4.—The antennæ are very frequently depressed, acuminate, triquetrous, or clavate.

## ÆDIPODINÆ.

- 1.—Vertex declined and, when seen from the side, united with the face by a curved line.
- 2.—The front is sub-perpendicular.
- 3.—The lateral foveolæ are present and visible from above.
- 4.—The antennæ are very rarely anything but filiform.

## CHARACTERS OF THE PRONOTUM.

- 5.—The width of the pronotum is little greater at the posterior than at the anterior end.

- 5.—The width of the pronotum is much greater at the posterior than at the anterior end.

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| <p>6.—The lateral carinæ are distinct.</p> <p>7.—The median carina is always cut by one sulcus, and it is never crested.</p> <p>8.—The prozone is not shorter than the metazone.</p> <p>9.—The posterior angle of the metazone is never sharp or acute angled, generally very obliquely and roundly angulate or straight.</p> <p>10.—The surface is generally smooth, not wrinkled or tuberculose.</p> <p>11.—The lateral lobes are generally plainly narrowed below, the anterior or posterior margin (one or both) being oblique.</p> | <p>6.—The lateral carinæ are obsolete.</p> <p>7.—The median carina is cut by one, two, three, or no sulcus, and it is often crested.</p> <p>8.—The prozone is shorter than the metazone.</p> <p>9.—The posterior angle of the metazone is very frequently sharp or acute angled, never straight.</p> <p>10.—The surface is generally wrinkled or tuberculose.</p> <p>11.—The lateral lobes are generally not narrowed below, but both the anterior and posterior margins are sub-perpendicular.</p> |
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## CHARACTERS OF THE TEGMINA AND WINGS.

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| <p>12.—The intercalary vein of the tegmina is generally wanting</p> <p>13.—The scapular area of the tegmina is often expanded, and the venation is scalariform.</p> <p>14.—Imperfect tegmina and wings are very common. Abortive and long-winged forms in the same species are not uncommon.</p> <p>15.—The tegmina are plain or striped. If maculate, the spots are not arranged in bands.</p> <p>16.—The wings are generally transparent, never bright colored, nor with a black band.</p> | <p>12.—The intercalary vein of the tegmina is commonly present.</p> <p>13.—The scapular area of the tegmina is narrow, and the venation irregularly reticulate.</p> <p>14.—Imperfect tegmina and wings are very rare. Abortive and long-winged forms in the same species do not occur.</p> <p>15.—The tegmina are plain or maculate, scarcely ever striped. If maculate, there is a tendency for the spots to be arranged in bands.</p> <p>16.—The wings are generally bright colored, and most generally have a black band.</p> |
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# KEY TO TRUXALINÆ.

- A.<sup>1</sup> Head distinctly longer than the pronotum, eyes very oblique, nearly horizontal; metasternal lobes contiguous. (Fig. 2b, 2c.)
- B.<sup>1</sup> Tegmina very much shorter than the abdomen; spines of the posterior tibiæ minute and numerous, about 25.....1.—*Radinotatum*, n. gen.
- B.<sup>2</sup> Tegmina exceeding the abdomen; spines of the posterior tibiæ less numerous, about 16.....2.—*Achurum*, Sauss.
- A.<sup>2</sup> Head sometimes equaling, never exceeding, the pronotum in length.
- B.<sup>1</sup> Mesosternal lobes separated by a space almost linear in its narrowest part (Fig. 3b); metasternal lobes approximate in both male and female.....3.—*Mermiria*, Stål.
- B.<sup>2</sup> Mesosternal lobes separated by a space never much longer than broad (Fig. 4b), generally broader than long (Fig. 11b); metasternal lobes rarely approximate in the male, very rarely in the female.
- C.<sup>1</sup> Antennæ triquetrous (Fig. 4a) or strongly depressed at the base and distinctly acuminate (Fig. 5a); pronotum with the lateral lobes vertical and straight and the lateral carinæ not at all sinuate (Fig. 5a); median carina of the pronotum generally cut much behind the middle (Fig. 3a); the disk plain and unstriped.
- D.<sup>1</sup> Spines of the exterior margin of the posterior tibia 15 or more; posterior margin of the disk of the pronotum nearly straight, scarcely angled or rounded.....4.—*Pseudopomala*, Morse.
- D.<sup>2</sup> Spines on the exterior margin of the posterior tibia less than 15; posterior margin of the disk of the pronotum obtusely angled or rounded.
- E.<sup>1</sup> Tegmina exceeding the abdomen considerably in both sexes (in some large females but little); lateral carinæ of the pronotum quite as distinct as the median; spurs at the apex of the posterior tibiæ on the inner side about equal.....5.—*Truxalis*, Fabr.

- E.<sup>2</sup> Tegmina not exceeding the abdomen, even in the male.
- F.<sup>1</sup> Lateral foveolæ of the vertex linear and distinct (Fig. 6); tegmina quite unspotted; inner spurs of the posterior tibiæ equal. . . . . 6.—*Napaia*, n. gen.
- F.<sup>2</sup> Lateral foveolæ less distinct and sub-triangular or obsolete; tegmina more or less distinctly spotted as well as the face and pronotum; inner tibial spurs very unequal, the longer but little shorter than the first tarsal joint. . . . . 7.—*Oreina*, n. gen. *Opeia*
- C.<sup>2</sup> Antennæ never triquetrous (Fig. 4a), sometimes plainly depressed basally and acuminate (Fig. 5a), most commonly filiform (Fig. 10a), rarely clavate (Fig. 9a); pronotum with the lateral lobes less distinctly vertical, with the lateral carinæ very rarely quite straight, but gently (Fig. 12a) or strongly (Fig. 10a) sinuate near the middle, median carina of the pronotum generally cut in or not far behind the middle. (Figs. 9a, 10a.)
- D.<sup>1</sup> Tempora either foveolate or plain, not visible from above. (Figs. 7a, 8a, 11a.)
- E.<sup>1</sup> Scutellum of the vertex with a distinct median carina which is usually a coarse raised line stronger anteriorly. (Figs. 7a, 8a, 12a.)
- F.<sup>1</sup> Spurs on the inner side of the posterior tibiæ very unequal, the apical spur being twice as long as the other (Figs. 8 and 9); antennæ very greatly exceeding the head and pronotum.
- G.<sup>1</sup> Antennæ depressed basally and distinctly acuminate. No supplementary carinæ (compare Fig. 9a) present either upon the head or disk of the pronotum. . . . . 8.—*Pedeticum*, n. gen.
- G.<sup>2</sup> Antennæ depressed apically and somewhat clavate. Supplementary carinæ accompanying the median carina upon either the head or the disk of the pronotum. (Fig. 9a). . . . 9.—*Eritettix*, Bruner.
- F.<sup>2</sup> Spines of the inner side of the posterior tibiæ about equal in length. (Fig. 11.)
- G.<sup>1</sup> Spines on the exterior margin of the posterior tibiæ 19–21. . . . . 10.—*Syrbula*, Stål.
- G.<sup>2</sup> Spines of the exterior margin of the posterior tibiæ not exceeding 15.
- H.<sup>1</sup> Median carina of the pronotum cut in the middle by the principal sulcus.
- I.<sup>1</sup> Color striped distinctly or obscurely. Scapular area of the tegmina broader than the mediastine area. (Fig. 11.)
- J.<sup>1</sup> Lateral carinæ of the pronotum obsolete, median carina accompanied by a supplementary pair upon the disk. (Fig. 11a). . . . . 11.—*Amphitornus*, n. gen.

- J.<sup>2</sup> Lateral carinæ of the pronotum present, median carina not accompanied by supplementary carinæ upon the disk. (Fig. 12a) . . . . . 12.—*Akentetus*, n. gen.
- I.<sup>2</sup> Color plain; scapular area of the elytra not broader than the mediastine area. (Fig. 13.) . . . . . 13.—*Amblytropidia*, Stål.
- H.<sup>2</sup> Median carina of the pronotum cut much behind the middle by the principal sulcus. . . . . 14.—*Chloealtis*, Harr.
- E.<sup>2</sup> Scutellum of the vertex with no distinct median carina. (Fig. 15a.)
- F.<sup>1</sup> Median carina of the pronotum cut much behind the middle by the principal sulcus.
- G.<sup>1</sup> Posterior margin of the metazone angulate. Tegmina usually much shorter than the abdomen, with the ulnar area not very much wider than the discoidal area. (Fig. 22, u.a., d.a.) . . . . . 15.—*Dichromorpha*, Morse.
- G.<sup>2</sup> Posterior margin of the metazone rounded or not distinctly angulate. Tegmina not much shorter than the abdomen, with the ulnar area very wide and several times as broad as the discoidal area . . . . . 16.—*Clinocephalus*, Morse.
- F.<sup>2</sup> Median carina cut near the middle by the principal sulcus.
- G.<sup>1</sup> Hind tibiæ never red. . . . . 17.—*Orphula*, Stål.
- G.<sup>2</sup> Hind tibiæ red.
- H.<sup>1</sup> Antennæ depressed basally, long and acuminate; face strongly oblique. . . . . 18.—*Alpha*, Brunner.
- H.<sup>2</sup> Antennæ filiform, face moderately oblique in the male, subperpendicular in the female. . . . . 19.—*Phlibostroma*, Scud.
- D.<sup>2</sup> Tempora plain or foveolate, visible from above (in *Mecostethus* small or minute, triangular, and basal (Fig. 22a). In this case the intercalary vein is very strong (Fig. 22). In *Boëtettix*, female, not very easily visible from above as they are almost vertical plain triangular spaces (Figs. 23a and 23b). In this case the antennæ are shorter than the head and pronotum and the lateral carinæ of the pronotum are wanting).
- E.<sup>1</sup> The vertex is not bounded in front by a raised line and, viewed from the side, it does not form an angle with the face. (Figs 20 and 21; compare 22 and 23.) The tempora are very faintly impressed spaces which are very strongly declivent. Intercalary vein of the tegmina wanting. (Figs. 20, 21.)
- F.<sup>1</sup> Tegmina plain; lateral carinæ of the pronotum very little sinuate. . . . . 20.—*Boöpedon*, Thos.

- F.<sup>2</sup> Tegmina distinctly spotted; lateral carinae of the pronotum strongly sinuate. . . . . 21.—*Plectrophorus*, n. gen.
- E.<sup>2</sup> The vertex bounded in front by a raised line, viewed from the side it forms a more or less distinct angle with the face or it is not at all angulate.
- F.<sup>1</sup> Median carina of the pronotum high and sharp, cut by the principal sulcus in, or plainly in front of, the middle. Intercalary vein very strong. Apical spurs on the inner side of the posterior tibiae subequal. . . . . 22.—*Mecostethus*, Fieb.
- F.<sup>2</sup> Median carina of the pronotum rarely cut plainly in front of the middle, in this case it is not high and sharp, or the intercalary vein is not strong. (In *Strapleura* and *Psoloëssa* the intercalary vein is present but not very strong and the inner apical spurs of the posterior tibiae are very unequal).
- G.<sup>1</sup> Lateral carinae of the pronotum entirely obsolete even on the metazone and the anterior of the prozone. Scapular area of the tegmina of the male forming a conspicuous musical organ.
- H.<sup>1</sup> Vertex of the head forming an acute angle with the face; tempora nearly plain triangular spaces. . . . . 23.—*Boëtettix*, Bruner.
- H.<sup>2</sup> Vertex of the head forming an obtuse angle with the face. Tempora impressed, trapezoidal. . . . . 24.—*Ligurotettix*, n. gen.
- G.<sup>2</sup> Lateral carinae of the pronotum usually distinct, present at least upon the metazone and the anterior part of the prozone.
- H.<sup>1</sup> Tempora elongate, narrow, from two to four times as long as broad. The apical spur on the inner side of the posterior tibiae is much less than twice as long as the one beside it.
- I.<sup>1</sup> Antennae filiform.
- J.<sup>1</sup> Median carina of the pronotum cut in the middle. Posterior margin of the pronotum plainly more angulate than the anterior. . . . . 25.—*Stenobothrus*, Fisch.
- J.<sup>2</sup> Median carina of the pronotum cut plainly behind the middle. Posterior margin of the pronotum not more angulate than the anterior. . . . . 26.—*Brunneria*, n. gen.
- I.<sup>2</sup> Antennae clavate. . . . . 27.—*Gomphocerus*, Thunb.
- H.<sup>2</sup> Tempora short, little more than once as long as broad or, when twice as long, the apical spur on the inner side of the posterior tibiae is twice as long as the one beside it.
- I.<sup>1</sup> Posterior margin of the metazone straight or just perceptibly angulate. Pronotum shorter than the head, which is very large. . . . . 28.—*Pnigodes*, n. gen.

- I.<sup>2</sup> Posterior margin of the metazone distinctly or strongly angulate. Pronotum never shorter than the head, generally plainly longer (viewed from above).
- J.<sup>1</sup> Median carina of the pronotum cut behind the middle of the pronotum. Vertex of the head destitute of a median carina. Posterior margin of the metazone very obtusely angulate . . . . . 29.—*Eremnus*, n. gen.
- J.<sup>2</sup> Median carina of the pronotum cut more or less plainly in front of the middle, never behind. Summit of the head furnished with a more or less distinct median carina which sometimes extends nearly or quite to the tip of the vertex and is most distinct on the posterior part of the scutellum. Posterior margin of the metazone strongly angulate.
- K.<sup>1</sup> Lateral lobes of the pronotum furnished with a single or double series of short irregular and sometimes indistinct carinæ which extend from about the middle of the anterior margin toward or to the upper posterior angle; also with a second more distinct, low, broad, light-colored carina which extends from the middle of each lobe toward the lower posterior angle. Sometimes this carina is distinct only at the anterior end. Face nearly perpendicular, rarely very moderately inclined. Frontal costa sulcate throughout, acuminate at the vertex and regularly divergent below . . . . . 30.—*Stirapleura*, Scud.
- K.<sup>2</sup> Lateral lobes of the pronotum destitute of carinæ. Face distinctly and considerably oblique. Frontal costa not sharply acuminate above and scarcely sulcate at any point . . . 31.—*Psoloëssa*, Scud.

I. **RADINOTATUM**,\* n. gen. Fig. 1.

Sexes very unequal in size. Body very slender and considerably compressed. Head plainly longer than the pronotum, elongate pyramidal with the occiput and vertex in the same plane, ascending, the face extremely inclined and, viewed from the side, decidedly sinuate. The vertex in front of the eyes is about as long as the eyes, somewhat longer than broad with the lateral margins parallel, and suddenly and roundly acuminate in front where they form an angle a little greater than 90 degrees. The margins of the vertex are not raised, but are extended horizontally into lamellæ which are wider anteriorly where they equal the lesser diameter of the eye. The scutellum of the ver-

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\**Ραδινότατον*, a very slender thing.

tex is concave with a median carina which continues to the end of the body. The tempora are entirely wanting. The frontal costa is a high, narrow ridge just below the vertex, very quickly expanding to form a very narrow deeply sulcate costa with the walls elevated and nearly parallel except on the lower part of the face where they expand slightly. The antennæ are short, triquetrous, placed higher than the eyes. The eyes are elongate ovate and are placed nearly horizontally. The ocelli are above the eyes instead of in front of them. The pronotum has all of the carinæ distinct and parallel, the median only being cut by the principal transverse incision about one-fourth the distance from the posterior border which is straight. The lateral lobes are vertical, with the lower border straight, the lower angles sharp, the anterior obtuse, the posterior acute, the anterior border very oblique and straight and the posterior border with a reëntral angle. Mesosternal lobes approximate, at least behind, in both male and female, metasternal lobes approximate behind in the female, approximate throughout in the male. Tegmina very rudimentary. Supra-anal plate of the male very long and acute, much exceeding the last ventral segment. Posterior femora very slender, scarcely compressed, with the apical angles produced. Spines of the posterior tibia minute and very numerous. Inner apical spur of the posterior tibiæ much longer than the outer.

This genus is based upon the single species formerly known as *Achurum brevipenne*, Thos. The genus *Achurum* was founded upon the species *A. sumichrasti*, Sauss., and made by Stål to include the closely allied species *A. acridoides*, Stål, but these species are so radically different from *R. brevipenne*, Thos., in the structure of the posterior femora, and in the last ventral segment of the male, as well as in the tegmina, in the absence of the lateral foveolæ, and in other particulars, that it makes the erection of a new genus advisable.

In part, *Truxalis* (*Achurum*) Sauss., 1861. Orth. Nov. Am. Ser. II, 15.

In part, *Achurum*, Stål, 1873. Recen. Orth. I, 89.

In part, *Achurum*, Brunner, 1893. Rev. Sys. Orth. 118.

R. BREVIPENNE, Thos. Fig. 1a, 1b.

Length (male).....	31	mm.	(female).....	43	mm.
Tegmina “ .....	4.5	mm.	“ .....	5	mm.
Antennæ “ .....	9	mm.	“ .....	6.5	mm.
Post. Fem. “ .....	14	mm.	“ .....	19	mm.

The median carina of the head is faint upon the posterior part of the occiput. The transverse sulci of the pronotum are obsolete except the principal one, which is barely visible as cutting the median carina. The lateral carinæ are not cut by any incision. The tegmina are about as long as the pronotum, very narrow, bluntly pointed and separated by a space nearly twice as great as their width. The posterior femora are very much (male) or decidedly (female) shorter than abdomen, very little expanded at the base. The spines of the posterior tibiæ are minute and very numerous, being about 25 on the outside. The supranal plate of the male is five times as long as the last abdominal segment and projects far beyond the abdomen.

*Truxalis brevipennis*, Thos., 1873. Syn. Acrid. N. Am., 58, pl. fig. 12.

*Achurum brevipennis*, Scud., 1877. Ent. Notes, VI, 29.

**Hab.** This species has been reported only from Florida, where it is probably not uncommon in suitable situations. According to Scudder it is common about Fort Reed, Fla. I have specimens from Orange, Fla., and the National Museum contains a female, which seems to be Thomas' type, and a single male without a label.

## II. **ACHURUM**, Sauss. Fig. 2.

Sexes not very unequal in size, very slender, with the head longer than the pronotum and the face approaching horizontal. The vertex is much longer than wide with the sides parallel and the front rounded, extending in front of the eyes a distance equal to their length. It is convex with a plain median carina. At the sides it is somewhat lamellate and horizontally extended. The frontal costa is a high, narrow ridge just below the vertex. A short distance below, it becomes sulcate and the sides are slightly divergent to the ocellus, below which they diverge with increasing rapidity and reach the clypeus. The face, seen from the side, is distinctly sinuate. The lateral foveolæ are distinctly linear and are separated from the face by a delicate carina. The eyes are long, elliptical, nearly horizontal and near the middle of the head. The antennæ are much flattened, triquetrous, regularly acuminate, and shorter than the head and pronotum. The pronotum is plain above with the three carinæ distinct and parallel; they are cut by the principal sulcus much behind the middle. The posterior margin of the metazone is roundly angulate. The lateral lobes of the pronotum are vertical and distinctly higher behind with the anterior and posterior borders much inclined, the latter sinuate and the lower

straight and in the same straight line with the lower margin of the cheeks. The prosternum has a very low pyramidal spine. The mesosternal lobes are separated by a space longer than broad in both sexes, and the metasternal lobes are contiguous behind. The tegmina and wings are very long and narrow; they exceed the abdomen much or little in length. The tegmina have the anal field forming a distinct angle with the discoidal field and they are acutely pointed. The ovipositor is small and moderately exerted. The posterior femora are unusually compressed and moderately wide on the basal portion. Their apical angles are produced into two blunt spines.

The posterior tibiæ are furnished on the outside with about 17 moderate spines and they have the apical spurs on the outside not very unequal to those on the inside. The supra-anal plate of the male is much shorter than the last ventral segment, which is acutely tapering and sharpest at the apex.

*Achurum*, Sauss., 1861. Orth. Nov. Am. II, 15.

*Achurum*, Stål., 1873. Recen. Orth., I, 89.

*Achurum*, Brunner, 1893. Rev. Sys. Orth., 118.

This is a North American genus represented by only two species.

#### KEY TO ACHURUM, Sauss.

- A.<sup>1</sup> Tegmina much exceeding the abdomen; pronotum alutaceo-rugose.....1.—*Sumichrasti*, Sauss.  
 A.<sup>2</sup> Tegmina not exceeding the abdomen; pronotum not alutaceo-rugose, vertex of the head, disk of the pronotum, and anal area of the tegmina green.....2.—*Acridodes*, Stål.

#### 1. ACHURUM SUMICHRASTI, Sauss. Fig. 2a, 2b, 2c.

*Truxalis* (*Achurum*) *sumichrasti*, Sauss., 1861. Orth. Nov. Am., II, 15.

*Truxalis* (*Achurum*) *sumichrasti*, Thos., 1873. Syn. Acrid. N. Am., 195.

*Achurum sumichrasti*, Walk., 1870. Cat. Derm. Salt., III, 518.

*Achurum sumichrasti*, Stål., 1873. Recen. Orth., I, 101.

**Hab.** This species is said by Saussure to belong to the temperate regions of Mexico. The National Museum contains specimens from Fort Grant, Arizona.

#### 2. ACHURUM ACRIDODES, Stål.

*Truxalis acridodes*, Stål., 1873. Ofv. Vet. Akad. Förh., 30:4, p. 52.

*Achurum acridodes*, Stål, 1873. Recen. Orth., I, 101..

*Achurum acridodes*, Thos., 1875. Rept. Geol. and Geog. Surv. W. 100 M., V, Zool., 865.

**Hab.** Mexico. It is doubtful whether this species is distinct from *A. sumichrasti*. I have not seen it.

### III. **MERMIRIA**, Stål. Fig. 3.

The head is long, sometimes equaling the pronotum, with the top slightly ascending, transversely moderately convex. Vertex horizontal, triangular or semi-elliptical, convex but more or less sulcate near the lateral carinæ, which are more or less distinct, never sharp and high, and which meet at an acute angle or are shortly or broadly rounded at the apex. The median carina of the vertex is either slight, but moderately distinct, or obsolete or entirely wanting. The lateral foveolæ are usually indistinct elongate triangular or sub-lunar spaces without distinct walls. The frontal costa is more or less completely sulcate (frequently very deeply sulcate between the antennæ) and strongly prominent, with the sides acuminate above and sub-parallel below, sometimes suddenly expanding and vanishing near the clypeus. The face, seen from the side, is straight or moderately or strongly sinuate and strongly (female) or very strongly (male) declivent. The antennæ are strongly triquetrous and acuminate and equaling (female) or exceeding considerably (male) the head and pronotum in length. The eyes are long ovate or elliptical and are placed very obliquely. The pronotum is long with the disk a little elevated toward the median carina which is distinct and cut once, more or less plainly, much behind the middle. The lateral carinæ are rarely distinct, usually indistinct or wanting, almost straight and parallel or very slightly divergent on the metazone. The latter has the posterior margin nearly straight or very obtusely angulate or gently rounded. The lateral lobes of the pronotum are vertical and parallel with both the anterior and posterior margins strongly oblique (the latter a little sinuate) and the lower margin straight and in the same line with the lower border of the cheeks. The prosternum has a low quadrate bent spine. The mesosternal lobes are separated by a space longer than broad (female) or are closed (male); the metasternal lobes are closed entirely (male) or behind (female). The tegmina and wings are well developed, usually equaling or exceeding the abdomen. The former have the scapular area a little widened and transparent and somewhat regularly scalariform. The

ovipositor is very short and small, scarcely exerted. Last ventral segment usually elongate and pointed, supra-anal plate acutely tapering. Posterior femora elongate and narrow. Posterior tibiae with about 19 spines on the outer side. A distinctly post-ocular stripe of ferruginous or brown is usually present on the sides of the head and the lateral lobes of the pronotum and in the male, at least, a longitudinal median stripe of the same color extends from the vertex to the posterior edge of the pronotum.

*Mermiria*, Stål, 1873. Recen. Orth., I, 90.

*Mermiria*, Thos., 1875. Rept. Geol. and Geog. Surv. W. 100 Mer., V, Zool., 866.

*Mermiria*, Brunner, 1893. Rev. Sys. Orth., 119.

In part, *Opsomala*, Serv., 1838. Hist. Nat. Orth., 586.

In part, *Opsomala*, Burm., 1838. Handb. Ent., II, 610.

In part, *Opomala*, Thos., 1873. Syn. Acrid. N. Am., 62.

*Xiphicera*, Perty. Ins. Am. Mer.

This genus is represented by six closely allied species in North America. All the species known are natives of the Southern and Southwestern States though the extreme limits of the range of some of them extends as far north as Nebraska and Illinois.

#### KEY TO MERMIRIA, Stål.

- A.<sup>1</sup> Face, seen from the side, straight, head distinctly shorter than the pronotum.
- B.<sup>1</sup> Posterior femora not exceeding the tegmina, which are unspotted. Vertex rather shortly than broadly rounded in front.
- C.<sup>1</sup> Vertex with some trace of a median carina. Posterior femora very long and slender, exceeding the abdomen in both sexes. Last ventral segment of male elongate, acutely tapering to a point. .... 1.—*Bivittata*, Serv.
- C.<sup>2</sup> Vertex entirely destitute of a median carina. Posterior femora comparatively short and heavy, not quite reaching the end of the abdomen in the female. Last ventral segment short and not acutely tapering to a point. .... 2.—*Texana*, Bruner.
- B.<sup>2</sup> Posterior femora exceeding the tegmina in both sexes. Tegmina generally spotted. Vertex broadly rounded. .... 3.—*Maculpennis*, Bruner.
- A.<sup>2</sup> Face seen from the side plainly sinuate. Vertex as long as or longer than broad. Head as long as the pronotum.

- B.<sup>1</sup> Vertex semi-elliptical rather than triangular with a faint median carina. Lateral carinæ of the pronotum present and moderately distinct. Posterior margin of the metazone hardly perceptibly rounded. . . . . 4.—*Neomexicana*, Thos.
- B.<sup>2</sup> Vertex triangular rather than semi-elliptical. Lateral carinæ of the pronotum scarcely apparent. Posterior margin of the metazone plainly though very obtusely angulate or rounded.
- C.<sup>1</sup> Vertex sub-triangular with the sides generally arcuate and the tip rounded, the median carina not entirely obsolete. The top of the head green with a ferruginous median stripe (at least in the male). Face green with a ferruginous stripe at each side. Median carina of the pronotum distinct, the sulci faint but visible. . . . . 5.—*Alacris*, Scud.
- C.<sup>2</sup> Vertex acutely triangular with the sides straight and the tip hardly blunt even in the female, the median carina entirely wanting. The top of the head with a very broad fuscous stripe (at least in the male) which is separated from the post ocular stripe by a green stripe no wider than the latter. Face purplish. Median carina of the pronotum less distinct. Sulci obsolete. . . . 6.—*Rostrata* n. sp.

## 1. MERMIRIA BIVITTATA, Serv.

- Opomala bivittata*, Serv., 1839. Hist. Nat. Ins. Orth., 589.
- Opomala bivittata*, Walk., 1870. Cat. Derm. Salt., III, 507.
- Opomala bivittata*, Thos., 1865. Trans. Ill. State Agr. Soc., V, 447.
- Opomala bivittata*, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 429.
- Opomala bivittata*, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 432.
- Opomala bivittata*, Scud., 1872. Final Rept. U. S. Geol. Surv. Neb., 250.
- Opomala bivittata*, Thos., 1873. Syn. Acrid. N. Am., 65, fig. 16.
- Acridium bivittata*, Bruner, 1877. Can. Ent., IX, 144.
- Acridium bivittatum*, de Haan, 1842. Bijdr. Kenn. Orth., 143.
- Mermiria bivittata*, Scud., 1877. Cent. Orth., 47.
- Mermiria bivittata*, Bruner, 1883. 3d Rept. U. S. Ent. Com., 55.
- Mermiria bivittata*, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, no. 4, 130.
- Mermiria bivittata*, Osborn, 1892. Proc. Iowa Acad. Sci., 1890-91, 4.

*Mermiria bivittata*, Townsend, 1893. Ins. Life, VI, 31.

**Hab.** United States east of the Rocky Mountains, extending as far north as Nebraska, Illinois, and Virginia.

This is the most widely distributed species of the genus.

## 2. MERMIRIA TEXANA, Bruner.

*Mermiria texana*, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 53, pl. i, fig. 2.

**Hab.** Lerodo, Durango, Mex.; El Paso, Tex. (Bruner); Colorado Springs, Col.; Ft. Grant, Arizona. It is said by Bruner to be "met with only among the sisal producing plants growing upon the rocky hills back from the rivers."

## 3. MERMIRIA MACULIPENNIS, Bruner.

*Mermiria maculipennis*, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 54.

**Hab.** San Antonio, Carrizo Springs, Texas. (Bruner.)

The National Museum contains one of Bruner's types from Carrizo Springs and several other specimens from the same State, and in addition a male and female from Risville, Nevada, and a female from Kansas which have the tegmina unspotted, but in other respects seem to be very much like this species. It is possible that the species is not distinct from *M. bivittata*.

## 4. MERMIRIA NEOMEXICANA, Thos.

*Opomala neomexicana*, Thos., 1870. Proc. Acad. Nat. Sci. Phil., 77.

*Opomala neomexicana*, Thos., 1871. Prelim. Rept. U. S. Geol. Sur. Wyo., 269.

*Opomala neomexicana*, Thos., 1872. Prelim. Rept. U. S. Geol. Sur. Mont., 429 and 432.

*Opomala neomexicana*, Thos., 1873. Syn. Acrid. N. A., 65.

*Opomala neomexicana*, Bruner, 1877. Can. Ent., IX, 144.

*Mermiria neomexicana*, Scud., 1876. Bul. U. S. Geol. and Geog. Sur., II, 262.

*Mermira neomexicana*, Scud., 1877. Cent. Orth., 47.

*Mermiria neomexicana*, Bruner, 1883. 3d Rept. U. S. Ent. Com., 55.

*Mermiria neomexicana*, Bruner, 1885. Rept. Com. Agr., 307.

*Mermiria neomexicana*, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, no. 4, 130.

*Mermiria neomexicana*, Bruner, 1886. Bul. Wash. Col. Lab. Nat. Hist., I, No. 7, 196.

*Mermiria belfragei*, Stål, 1873. Recen. Orth., I, 102.

*Mermiria belfragei*, Thos., 1875. Rept. Geog. and Geol. Surv. W. 100 M., V. Zool., 856 and 901.

*Mermiria belfragei*, Scud., 1877. Cent. Orth., 47.

**Hab.** The eastern slopes of the Rocky Mountains from Wyoming to New Mexico and eastward to Georgia.

The National Museum contains a specimen which seems to be the type. Except *M. bivittata* it is the most widely distributed species of the genus. It seems to be partial to regions where vegetation is sparse.

5. *MERMIRIA ALACRIS*, Scud. Fig. 3a, 3b.

*Mermiria alacris*, Scud., 1877. Cent. Orth., 47.

*Mermiria alacris*, Bruner, 1883. 3d Rept. U. S. Ent. Com., 55.

**Hab.** Georgia (Scudder), Dallas, Tex.

The National Museum contains a male and female from the last mentioned locality.

6. *MERMIRIA ROSTRATA*, n. sp. Fig. 3c.

Length (male).....36 mm (female).....46 mm.  
 Antennæ.....16 mm  
 Tegmina.....24 mm.....33.5 mm.  
 Post. Fem.....18 mm

Vertex triangular, as long as (female) or longer than (male) wide with the sides straight and meeting at a very acute angle which is barely blunt at the tip. The median carina of the vertex is entirely wanting and the sides are somewhat expanded and a little ascending. The frontal costa is deeply sulcate throughout in the male and in the female above the ocellus; below it ends suddenly half-way between the ocellus and the clypeus. The face is very decidedly sinuate. The lateral foveolæ are quite distinct, elongate triangular and curved. The pronotum is scarcely (female) or not longer than the head. The median carina is less distinct than in *alacris* and the lateral carinæ are very faint. The transverse sulci are scarcely distinguishable and the metazone is scarcely perceptibly punctate. The lower margin of the lateral lobes of the pronotum is straight or perceptibly sinuate. The usual postocular band has at its lower border a very faint carina (in this respect it resembles *alacris* and *bivittata*). The colors are green and ferruginous or purplish-brown, the dark color being more decided in the male. In this sex the face is completely infuscated and the top of the head is occupied by a very broad band which is three times as

broad as the green stripe on either side. The lower half (female) or third (male) of the tegmina is green, the rest ferruginous. The last ventral segment is decidedly elongate as in *alacris*. The posterior femora do not exceed the abdomen.

Described from two males and one female from Mackay, I. T., where the species is said by the collector, Prof. S. E. Meek, to be common on the small prairies which are interspersed through the forests of that region.

This species is more closely related to *alacris* than to any other of the *Mermiria*, but it is readily distinguished by the very different vertex.

#### IV. PSEUDOPOMALA, Morse. Fig. 4.

Vertex horizontal, longer than broad, semi-elliptical, medianly convex with a very distinct carina, laterally sulcate (female) or extended into lamina (male), with the margins limited by lateral carinæ. The lateral foveolæ are wanting. The frontal costa is sulcate throughout with slightly divergent heavy lateral carinæ except at the immediate apex where it is much constricted. The face is very declivent and straight or a very little sinuate on account of the prominence of the frontal costa between the antennæ. These are very slightly triquetrous and very much flattened and expanding basally, equaling the short diameter of the eye nearly (male) or quite (female) and strongly acuminate. They equal the head and pronotum in length (female) or greatly exceed them (male). The pronotum is but little longer than the head. Its disk is nearly plain, slightly elevated toward the median carina which is distinct and cut only once much behind the middle by the principal sulcus which alone is apparent upon the disk. The lateral carinæ are distinct, parallel, cut by the principal sulcus only. The posterior margin of the metazone is straight. The lateral lobes of the pronotum are vertical, slightly convex above, with the anterior and posterior margins strongly oblique, the one straight, the other sinuate just above the posterior lower angle, which is sharp and sub-rectangular. The lower margin is nearly straight and horizontal. The mesosternal lobes are separated by a space longer than broad (female) or by a linear ridge with a deep pit on either side (male). The wings in both sexes and the tegmina (female) are abortive or they are well developed. In the male the scapular area is enlarged with prominent cross veins. The posterior femora are slender, not banded. The posterior tibiæ has the apical spurs on the inner side not very unequal.

The last ventral segment of the male is horizontal, elongate, conical and four times as long as the penultimate segment. The valves of the ovipositor are exerted, the lower ones furnished with a strong lateral tooth, the upper ones with two distinct basal teeth.

This genus is North American and is represented by two species.

*Pseudomopala*, Morse, 1896. *Psyche*, VII, 325 and 342, fig. 6, 6a, 6b.

*Opomala*, Scud., 1862. *Journ. Bost. Soc. Nat. Hist.*, VII, 454.

In part, *Opomala*, Thos., 1873. *Syn. Acrid. N. Am.*, 62.

#### KEY TO PSEUDOPOMALA, Morse.

- A.<sup>1</sup> Wings wanting.....1.—*Aptera*, Scud.  
A.<sup>2</sup> Wings present, usually small.....2.—*Brachyptera*, Scud.

#### 1. PSEUDOPOMALA APTERA, Scud.

*Opomala aptera*, Scud., 1869. *Proc. Am. Ent. Soc.*, II, 305.

*Opomala aptera*, Walk., 1870. *Cat. Derm. Salt.*, V, 52.

*Opomala aptera*, Thos., 1873. *Syn. Acrid. N. Am.*, 63.

*Opomala aptera*, Bruner, 1877. *Can. Ent.*, IX, 144.

*Opomala aptera*, Bruner, 1883. 3d Rept. U. S. Ent. Com., 55.

**Hab.** Pennsylvania. It is very doubtful whether this species is distinct from *P. brachyptera*. Bruner apparently recognized it in Nebraska (in *Can. Ent.*, IX, 144), but later he refers it to Pennsylvania alone, which was Scudder's original reference. It has never been reported there since its first mention and it is not found in any (not even Scudder's) collection with which I am acquainted. It seems altogether probable, therefore, that it is merely an apterous form of *brachyptera*. I think it best, however, not to place it in the list of synonyms until further collections are made in the place where it was found and its identity is thoroughly established.

#### 2. PSEUDOPOMALA BRACHYPTERA, Scud. Fig. 4a, 4b.

*Opomala brachyptera*, Scud., 1862. *Jour. Bost. Soc. Nat. Hist.*, VII, 454.

*Opomala brachyptera*, Thos., 1871. *Proc. Acad. Nat. Sci. Phila.*, 151.

*Opomala brachyptera*, Thos., 1872. *Prelim. Rept. U. S. Geol. Surv. Mont.*, 429, 432, 446.

*Opomala brachyptera*, Thos., 1873. *Syn. Acrid. N. Am.*, 63.

*Opomala brachyptera*, Bruner, 1877. *Can. Ent.*, IX, 144.

*Opomala brachyptera*, Bruner, 1883. 3d Rept. U. S. Ent. Com., 55.

*Opomala brachyptera*, Fernald, 1887. *Orth. N. E.*, 35.

- Opomala brachyptera*, Bruner, 1885. Rept. Com. Agr., 307.  
*Opomala brachyptera*, Morse, 1894. Psyche, VII, 13 and 106.  
*Opomalo brachyptera*, Beutenmüller, 1894. Desc. Cat. Orth., 291.  
*Opsomala brachyptera*, Walk., 1870. Cat. Derm. Salt., III, 507.  
*Pseudopomala brachyptera*. Morse, 1896. Psyche, VII, 325 and 343, fig. 6, 6a, 6b.  
*Mermiria brachyptera*, Osborn, 1892. Proc. Iowa Acad. Sci., 1890-1891, 4.

**Hab.** Northern United States east of the Sierra Nevada Mountains. This species has an extended range east and west, though its distribution throughout the territory it inhabits is comparatively irregular. There is a gap in this range extending from Illinois to New York and Pennsylvania (unless *P. aptera* is a synonym), but since it is found in New England and from Iowa to Utah there is little doubt but that its non-occurrence in the intermediate area is due to the fact of its extreme rarity.

#### V. **TRUXALIS**, Fabr.

Vertex horizontal, semi-elliptical, length in front of the eyes a little less (female) or a little more (male) than the distance between the eyes. Furnished with a delicate median carina. Lateral carinae distinct though slight with shallow sulci behind them. Lateral foveolae entirely wanting. Frontal costa narrow, deeply (male) or shallowly (female) sulcate except just below the vertex where it is suddenly contracted into a mere ridge. The face, seen from the side, is strongly oblique and straight. The antennae are flattened strongly (female) or moderately (male) at the base and acuminate, about as long as (female) or a little longer than (male) the head and pronotum. The pronotum has the disk plain with the three carinae parallel, about equally distinct, the median cut by the last sulcus only, the lateral by all the transverse incisions. The metazone is a little shorter than the prozone with its posterior border very obtusely angled. The lateral lobes of the pronotum are perpendicular and parallel, a little longer than high, with both the anterior and posterior margins decidedly oblique, the former straight, the latter sinuate with the lower border straight posteriorly and slightly oblique anteriorly. The lobes of the mesosternum are separated by a space broader than long (female) about as broad as long (male). The lobes of the metasternum are separated by a space about as broad as long (female) or they are contiguous (male). The tegmina are much longer than the abdomen, with the discoidal area

with no intercalary vein. The posterior femora are slender with the apex reaching (female) or exceeding by half their length (male) the abdomen. The valves of the ovipositor of the female are strongly exerted.

In part, *Gryllus* (*Acrida*), Linn.

In part, *Truxalis*, Fabr., 1875. Sys. Ent., 279.

In part, *Truxalis*, Burm., 1838. Handb. 606, Orth.

*Truxalis*, Stål, 1873. Recen. Orth., I, 92.

*Truxalis*, Morse, 1896. Psyche, VII, 325, fig. a, aa, ab.

*Metaleptea*, Brunner, 1893. Rev. Sys. Orth., 118.

Not *Truxallis*, Serv., 1839. Hist. Nat. Orth., 578.

Not *Truxalis*, Brunner, 1883. Proc. Eur. Orth., 87.

Not *Truxalis*, Brunner, 1893. Rev. Sys. Orth., 118.

In 1873 Stål, in Rec. Orth., I, saw fit to restore *Acrida*, Linn., restricting it to Linnean species, *Grillus* (*Acrida*) *nasuta* and *Acrida serrata*, Thunb. Both of these species had been included in *Truxalis*, Fabr., for more than one hundred years. The latter genus he restricted to the Linnean species *Grillus* (*Acrida*) *brevicornis* and other American species which have since been removed to other genera. There is no doubt but that Stål had a right to restore the name *Acrida*. Brunner refused to follow him in the restoration of *Acrida* and the restriction of *Truxalis*, but himself restored *Truxalis* in the Fabrician sense and then suggested the name *Metaleptea* for the American genus. For the present, *Truxalis*, Stål, must stand and *Metaleptea* will remain a synonym unless *Truxalis* is restricted to some of the old world species included in the genus by Fabricius; under which circumstances, as *T. brevicornis* is the only species left to which it could apply, *Metaleptea* would have to be restored.

#### 1. TRUXALIS BREVICORNIS, Linn., 5a, 5b.

*Gryllus* (*Acrida*) *brevicornis*, Linn., 1758. Sys. Nat. Orth., I.

*Gryllus* (*Acrida*) *brevicornis*, Linn., 1763. Cent. Ins. Rar., 15.

*Gryllus* (*Acrida*) *brevicornis*, Linn., 1763. Amoen. Acad., VI, 398.

*Truxalis brevicornis*, Fabr., 1775. Ent. Sys., II, 27.

*Truxalis brevicornis*, Thunb., 1815. Mem. Acad. St. Peter., V, 264.

*Truxalis brevicornis*, Thunb., 1827. Nov. Act. Upsal., IX, 84.

*Truxalis brevicornis*, Stål, 1873. Recen. Orth., I, 104.

*Truxalis brevicornis*, Thos., 1876. Bul. I, Ill. Mus. Nat. Hist., 61.

*Truxalis brevicornis*, McNeill, 1891. Psyche, VI, 66.

*Truxalis brevicornis*, Blatchley, 1891. Can. Ent., XXIII, 75.

*Truxalis brevicornis*, Garman, 1894. 6th Ann. Rept. Ky. Agr. Ex. Sta., 8.

*Truxalis brevicornis*, Blatchley, 1894. Can. Ent., XXVI, 221.

*Truxalis brevicornis*, Beutenmüller, 1894. Desc. Cat. Orth., 29, pl. viii, fig. 7.

*Acridium ensicormum*, De Geer, 1773. Mem. Ins., 449, pl. xlii, fig. 1, 2.

? *Truxalis notochlorus*, Pal. de Beauv., 1805. Ins. Afr. Amer., 80, pl. iii, fig. 3.

? *Truxalis viridulus*, Pal. de Beauv., 1805. Ins. Afr. Amer., 81, pl. iii, fig. 4.

*Tryxalis brevicornis*, Burm., 1838. Handb. Ent., II, 607.

*Tryxalis brevicornis*, Morse, 1896. Psyche, VII, 325, fig. A, Aa, Ab.

*Pyrgomorpha brevicornis*, Thos., 1873. Syn. Acrid. N. Am., 67.

*Pyrgomorpha brevicornis*, Thos., 1874. Bul. 2, U. S. Geol. and Geog. Surv. 64.

*Pyrgomorpha brevicornis*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.

*Pyrgomorpha punctipennis* Thos., 1873. Syn. Acrid. N. Am., 68.

*Pyrgomorpha punctipennis*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.

*Pyrgomorpha punctipennis*, Schufeldt, 1884. Proc. U. S. Nat. Mus., VII, 332.

*Opomala punctipennis*, Serv., 1838. Hist. Nat. Ins. Orth., 590.

*Opomala punctipennis*, Thos., 1865. Trans. Ill. State. Agr. Soc., 447.

*Opomala punctipennis*, Walk., 1870. Cat. Derm. Salt., III, 507.

*Opomala punctipennis*, Thos., 1873. Syn. Acrid. N. Am., 197.

**Hab.** Eastern and Southern United States. Reported by Stål from Rio Janeiro, Brazil. By Walker, from Honduras. *T. notochlorus* and *viridulus* are reported by Pal. de Beauv. from St. Domingo.

#### VI. **NAPAIA**, n. gen. Fig. 6.

Vertex horizontal, equilaterally triangular, moderately sulcate, with distinct linear median and lateral carinæ. The lateral foveolæ are plainly visible from above, long rhomboidal. The frontal costa is prominent a little above the antennæ, not constricted just below the apex, slightly sulcate below the ocellus and moderately expanding below. The face seen from the side is strongly (female) or very (male) declivent. The antennæ are strongly depressed at the base and acu-

minate, a little longer than the head and pronotum (female) or as long as the hind femora (male). The pronotum has the disk plain, furnished with three carinæ, the median being a little more distinct, the lateral being very slightly sinuate, and all three are cut much behind the middle. The posterior margin of the metazone is very slightly angulate. The lateral lobes of the pronotum are nearly perpendicular, a little convex on the upper part with the anterior and the posterior margins straight and strongly oblique and with the lower margin posteriorly a little descending, anteriorly slightly ascending. The prosternum is armed with a low (female) or high (male) tubercle. The mesosternal lobes are separated by a space a little (female) or not (male) broader than long. The metasternal lobes are very nearly approximate behind. The tegmina are much (female) or a little (male) shorter than the abdomen, the scapular area is expanded and occupied by weak cross veins in the male, the discoidal area is narrow without an intercalary vein and is filled with a single series of cross veins. The posterior femora are moderately slender, extending beyond the abdomen. The posterior tibiæ have about 13 spines on the outer margin. The valves of the ovipositor are very moderately exerted.

This genus contains, so far as known, but a single species. It is most closely related to *Mermiria*, but is easily distinguished from that genus by the distinct lateral foveolæ visible from above, the different structure of the frontal costa just below the vertex, the abbreviated tegmina, and the fewer spines of the posterior tibiæ.

NAPAIA GRACILIS, n. sp. Fig. 6a, 6b, 6c, 6d.

Yellow or brown with a fuscous stripe extending backwards from the eyes limited above by the lateral carinæ of the pronotum, either covering the whole of the sides including the cheeks, lateral lobes of the pronotum, the lower edge of the tegmina, the sides of the abdomen, and the outer face of the posterior femora (male) or it is more or less restricted below, but it is always present. The upper surface of the body and head is distinctly lighter than the sides, plain, or sometimes with two faint curved stripes extending on the top of the head from the corners of the vertex to the lateral carinæ of the pronotum. The tegmina are plain except for the more or less infuscated lower edge. In the male they are four-fifths as long as the abdomen, broadly rounded at the tip. In the female they are half as long as the abdomen, lanceolate with the tip blunt. The posterior femora extend a little (female)

or one-third their length (male) beyond the abdomen. The posterior tibiae are light (female) or very obscure (male) red infuscated at the apex.

Described from one female and one male, the latter collected by Mr. Coquillett at Los Angeles, the former bearing simply the label "California." All the specimens are in the collection of the National Museum. The male bears a very different appearance from the female with its very dark, nearly black color, more sloping face, longer tegmina and antennae and more slender form, but the structure of the head and pronotum is exactly the same and I think that there is scarcely any doubt but that they belong to the same species.

#### VII. **OPEIA**, n. gen. Fig. 7.

Vertex nearly horizontal shorter than the distance between the eyes, convex, a little sulcate behind the prominent lateral carinae which meet at an angle of about 90 degrees. Median carina distinct. Lateral foveolae not visible from above, they are small sulci which extend from the ocelli toward the vertex and are not clearly separated from the front. The frontal costa is sulcate except at the apex, and its margins are slightly and regularly expanded downward. Seen from the side, the face is straight and strongly declivent. The antennae are considerably flattened basally and regularly acuminate, distinctly shorter than the head and pronotum. The pronotum has the disk nearly plain, being slightly elevated to the median carina. This and the lateral carinae are unusually heavy and distinct and all three are cut by the principal sulcus only much behind the middle. The lateral carinae are very slightly divergent from the middle of the pronotum to the posterior margin which is roundly angulate. The lateral lobes of the pronotum are not quite so high as long; they are nearly perpendicular, being very slightly convex above, and they have a nearly horizontal carina extending from the middle to the posterior margin. They have the anterior and posterior borders strongly oblique with the lower margin nearly straight. There is no prosternal tubercle. The mesosternal lobes are separated (female) by a space about as long as wide, the metasternal lobes by a space longer than wide (female) or nearly contiguous (male). The tegmina are little shorter than the abdomen (female). The discoidal area is occupied by a weak intercalary vein. The scapular area is decidedly expanded in the male, and filled with a single series of moderately strong curved cross veins. The posterior femora

are not slender, they extend somewhat beyond the end of the abdomen. The valves of the ovipositor are but little exerted.

This genus is represented in North America by a single species. It, with *Pedeticum*, is a connecting link between *Mermiria* and *Napaia* on the one side and *Amphitornus*, *Atkentetus*, and *Eritettix* upon the other.

*Oxycoryphus*, Thos., 1873. Syn. Acrid. N. Am., 72.

I. OPEIA OBSCURA, Thos. Fig. 7a, 7b, 7c.

*Oxycoryphus obscurus*, Thos., 1871. Pre. Rept. Surv. Mont., 446.

*Oxycoryphus obscurus*, Thos., 1873. Syn. Acrid. N. Am., 73.

*Oxycoryphus obscurus*, Bruner, 1883. 3rd Rept. U.S. Ent. Com., 55.

*Oxycoryphus obscurus*, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, No. 4, 130.

*Oxycoryphus obscurus*, Bruner, 1885. Rept. Com. Agr., 307.

This is an extremely variable species in every way. The coloration in particular is so variable that it is difficult to describe. In typical specimens the dorsum is brown or green, nearly plain with sometimes a streak of fuscous along the median carina. The sides are marked by a stripe which extends backward from the eye, widening and generally becoming more obscure. When most distinct, this stripe consists of five parts, as follows: an upper streak of brown or fuscous below the lateral carinæ, below this a lighter streak followed by a white line, and still below this the light and dark streak repeated. Apparently these five elements of the lateral stripe may be varied in intensity of coloration in any way so that the great dissimilarity in appearance is produced. Nearly always, however, all these parts can be distinctly or faintly seen, and in all cases the lower fifth of the pronotum at least is brown. The tegmina have the discoidal area occupied by a row of large usually distinct quadrate fuscous spots and the scapular area contains a whitish streak.

**Hab.** West of Missouri and Arkansas and east of the Rocky Mountains. This seems to be a species peculiar to the great plains. Its range is unusually great north and south, as it extends from the northern to the southern boundaries of the United States and probably much farther in each direction, while it is somewhat restricted east and west. Bruner says it "occurs where the grasses are short and the climate is arid," and reports it as common in the Yellowstone Valley. The National Museum contains two females and one male which seem

to be Thomas' type as they bear his label. His description of the species, however, was based upon the female. In addition to these are numerous specimens from Nebraska, Texas, and Wyoming. Two females from Texas are of larger size than the others, the lateral stripe is distinct and occupies the upper half of the lateral lobe of the pronotum, and the vertex is a little wider and more rounded.

#### VIII. PEDETICUM, n. gen. Fig. 8.

This genus is very closely related to *Opeia*, and does not differ materially in the structure of the head except in the possession of supplementary lateral carinae more or less distinct. In the following particulars it seems to be too different to be united with that genus. The pronotum has the lateral carinae strongly sinuate a little in advance of the middle. None of the carinae are cut by any of the sulci, and these are almost entirely obsolete. The anterior and posterior borders of the disk of the pronotum are straight. The mesosternal lobes are separated by a space decidedly (female) or a little broader than long, and the metasternal lobes are contiguous behind and inclose two very deep pits. The tegmina are abbreviated, less than one-half (female) or nearly three-fourths (male) as long as the abdomen. The valves of the ovipositor are moderately exerted.

This genus contains but one species which, in spite of its very different appearance, is really closely related to *Opeia obscurus*, Thos. I should have hesitated to erect this genus but that if it is not done Scudder's species would become a synonym and I should be compelled to give it a new specific name; and in case these species should afterwards be considered generically distinct (and this seems extremely probable as the tendency undoubtedly is to restrict more and more generic groups) there would be a useless synonym.

##### 1. PEDETICUM OBSCURUM, Scud. Fig. 8a, 8b.

*Chrysochraon obscurus*, Scud., 1877 Ent. Notes, VI, 29.

*Chrysochraon obscurus*, Bruner, 1883. 3rd Rept. Ent. Com., 55.

**Hab.** Fort Reed, Florida.

As this specimen has not been reported in any other collection than that in which Dr. Scudder first found it there is little doubt but it is a local and very rare species. I have examined a specimen from Scudder's collection.

IX. **ERITETTIX**, Bruner. Fig. 9.

Head conical, occiput not elevated, furnished with three carinæ, one median and two supplementary; the former extends from the pronotum to the tip of the vertex where it is enlarged, the latter from the pronotum to a point opposite the anterior margin of the eyes where each suddenly bends to join the lateral carinæ of the vertex. The vertex is convex and equilaterally triangular. Its lateral carinæ are generally distinct, sometimes heavy, raised lines. The lateral foveolæ are present below the vertex, sub-triangular, not deeply impressed, sometimes not very apparent because of the slightness of the lower carinæ and because of their small size. The frontal costa has its sides somewhat regularly divergent from the vertex to the clypeus, generally a little constricted about the ocellus and slightly sulcate for a greater or less distance above this point but never sulcate to the vertex. The antennæ are thick, generally somewhat flattened at the base and clavate at the apex (except *variabilis*) which is bluntly acuminate and scarcely longer than the head and pronotum. The pronotum has the lateral and median carinæ distinct and cut once only by the principal sulcus decidedly behind the middle. In addition to these usual carinæ are two supplementary carinæ on either side about midway between the median and lateral carinæ. The posterior margin of the pronotum is very obtusely angulate. The lateral lobes of the pronotum are about as high as they are long, with the anterior border decidedly or little more oblique than the posterior. They have a more or less distinct carina which runs obliquely from the first sulcus to or toward the posterior margin. The anterior lower angle is obtuse, the posterior is rectangular. The lower margin is straight and horizontal on the posterior half, straight and slightly ascending on the anterior half. The mesosternal lobes are separated by a space much wider than long, and the metasternal lobes by a space longer than wide, in both sexes. The tegmina and wings are usually well developed (except *abortiva*). The former have the mediastine vein well developed, extending much beyond the middle of the wing and the scapular area in the male widened and filled with a series of rather weak and not very regular oblique veins. There is no intercalary vein and the dividing soon unites with the plicate vein. The ovipositor of the female is nearly included. The posterior femora are more than usually heavy, with the apex extending beyond the abdomen, and they are never banded. The posterior tibiæ are obscure or reddish, never blue, and the apical inner spur is about twice as long as the one behind it.

In part, *Stenobothrus*, Thos., 1873. Syn. Acrid. N. Am., 80.

In part, *Gomphocerus*, Thos., 1873. Syn. Acrid. N. Am., 96.

*Eritettix*, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 56.

This genus does not seem to have been known to Bruner, as there is nothing in his key to fit it. It falls near his South American genus *Toxopterus*, but is very distinct from that. It appears to be a purely North American genus, therefore, and the species that belong to it are widely distributed.

#### KEY TO ERITETTIX, Bruner.

- A.<sup>1</sup> Lateral carinæ of the pronotum straight or very gently arcuate. Oblique carina of the lateral lobes very slender or nearly obsolete. Disk of the pronotum furnished with two narrow or broad, black, velvety stripes just inside of the lateral carinæ.
- B.<sup>1</sup> Supplementary carinæ of the pronotum about as strong as the median. Space between the supplementary carinæ carneous or brown, and the space between the supplementary carinæ and eyes and lateral carinæ velvety black.
- C.<sup>1</sup> Antennæ clavate.
- D.<sup>1</sup> Wings hyaline.....1.—*Virgatus*, Scud.
- D.<sup>2</sup> Wings fuliginous.....2.—*Carinatus*, Scud.
- C.<sup>2</sup> Antennæ acuminate, not clavate.....3.—*Variabilis*, Brun.
- B.<sup>2</sup> Supplementary carinæ of the pronotum much weaker than the median or obsolete. Space between the supplementary carinæ little if any darker than the median space.
- C.<sup>1</sup> Tegmina with the posterior half green or brown with a light yellow or green stripe in the scapular area extending from the base to the middle.....4.—*Tricarinatus*, Thos.
- C.<sup>2</sup> Tegmina testaceous.....5.—*Simplex*, Scud.
- A.<sup>2</sup> Lateral carinæ of the pronotum moderately arcuate before the middle. Oblique carina of the lateral lobes very heavy and generally white or light colored, at least on the apical half.
- B.<sup>1</sup> Tegmina as long as or longer than the abdomen.....6.—*Naviculus*, Scud.
- B.<sup>2</sup> Tegmina abortive, a little (male) or not (female) more than half as long as the abdomen.....7.—*Abortivus*, Bruner.

#### 2. ERITETTIX VIRGATUS, Scud. Fig. 9a, 9b.

*Gomphocerus virgatus*, Scud., 1875. Cent. Orth., 23.

*Gomphocerus virgatus*, Bruner, 1883. 3rd Rept. Ent. Com., 56.

*Eritettix virgatus*, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 56.

**Hab.** Apparently a rare species, it has heretofore been reported only from Texas. It occurs also in Arkansas.

2. ERITETTIX CARINATUS, Scud.

*Gomphocerus carinatus*, Scud., 1875. Cent. Orth., 23.

*Gomphocerus carinatus*, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 56.

**Hab.** Middle States (Scud.).

I think there is little doubt but that this species is a variety of *E. virgatus* with fuliginous wings. I am unacquainted with it, however, and prefer to retain the name.

3. ERITETTIX VARIABILIS, Bruner.

*Eritettix variabilis*, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 56.

**Hab.** Silver City, New Mexico (Bruner).

This species is distinguishable from all others of the genus in having the antennæ acuminate instead of clavate at the tip.

4. ERITETTIX TRICARINATUS, Thos.

*Stenobothrus tricarinatus*, Thos., 1873. Syn. Acrid. N. Am., 84.

*Stenobothrus tricarinatus*, Bruner, 1883. 3rd Rept. Ent. Com., 55.

*Stenobothrus tricarinatus*, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 56.

*Stenobothrus tricarinatus*, Osborn, 1892. Proc. Iowa Acad. Sci., 1890-91, 4.

**Hab.** This species has been reported but once outside of Wyoming. Herbert Osborn gives it as not common in Iowa. The United States Museum contains numerous specimens from the first mentioned locality.

5. ERITETTIX SIMPLEX, Scud.

*Gomphocerus simplex*, Scud., 1869. Proc. Am. Ent. Soc., II, 305.

*Gomphocerus simplex*, Thos., 1873. Syn. Acrid. N. Am., 97.

*Gomphocerus simplex*, Bruner, 1877. Can. Ent., IX, 144.

*Gomphocerus simplex*, Bruner, 1883. 3rd. Rept. Ent. Com., 56.

**Hab.** Said by Scudder to occur in Delaware. It does not seem to have been recognized there since. It was reported by Bruner in 1877 in the Can. Ent., IX, 144, to occur in Nebraska. Since he gives Delaware as the only locality for this species in the 3rd Rept. Ent. Com., 56, in 1883, it is probable that he was mistaken in the first

reference. I am unacquainted with the species, but I think that it is probable that it is synonymous with *virgatus*.

6. *ERITETTIX NAVICULUS*, Scud.

*Gomphocerus navicula*, Scud., 1876. U. S. Geol. Surv. W. 100 Mer., App. JJ., 506.

*Gomphocerus navicula*, Bruner, 1883. 3rd. Rept. Ent. Com., 56.

**Hab.** Southern Colorado, Northern New Mexico, Montana. The National Museum contains Scudder's type from Southern Colorado, and another specimen from Montana. The latter does not agree closely with the type, but the divergence is no greater than should be expected in species so variable as the *Eritettix*.

7. *ERITETTIX ABORTIVUS*, Bruner.

*Eritettix abortivus*, Bruner, 1889. Proc. U. S. Nat. Mus., 56, pl. i, figs. 8 and 9.

**Hab.** Central Texas (Schaupp), Washington Co., Tex. (Bruner). This species is most nearly related to *naviculus*, but it is easily distinguished from that by its abortive tegmina and wings, its smaller size and very heavy and short antennæ.

X. *SYRBULA*, Stål. Fig. 10.

Head not much shorter than the pronotum with the occiput moderately rounded transversely, and slightly or considerably ascending. Vertex convex and more or less sulcate, horizontal and semi-elliptical or sub-triangular in shape with a distinct median carina not less apparent than the lateral carinæ, which are suddenly curved inward a short distance back of the anterior margin of the eye, and from that point together with the median carina are more or less distinctly continued to the pronotum. The lateral feveolæ, generally indistinct and small, are triangular in shape and invisible from above. The frontal costa is plain, a little convex or more or less sulcate, continued to or even upon the clypeus, decidedly constricted at the apex and very slightly at the ocellus. The antennæ are flattened decidedly at the base and distinctly acuminate (female) or are flattened moderately at the base and decidedly or strongly expanded apically and acuminate (male). The pronotum has the disk plain with the three carinæ distinct, the lateral being gently or strongly sinuate and very slightly or moderately divergent posteriorly. All are severed by a single sulcus

in or behind the middle. The metazone is sub-truncate or decidedly angulate. The lateral lobes of the pronotum are about as high as long with both the anterior and posterior margins moderately oblique, the latter generally sinuate and the lower margin nearly horizontal and scarcely perceptibly or very moderately angulate in the middle. Behind the principal sulcus the lateral lobes are generally deeply and thickly pitted. The mesosternal lobes are separated by a space not (male) or a little (female) broader than long, the metasternal lobes by a space longer than broad (female) or they are closed behind (male). The tegmina and wings are well developed, exceeding the abdomen. The former have a very different structure in the two sexes. In the male they are regularly reticulate everywhere except in the anal field and at the base of the scapular area which is opaque. This and the ulnar area being widened and furnished with a single series of conspicuous veins. In the female, they are irregularly reticulate throughout and not expanded in the ulnar or scapular areas. The legs are moderately or quite slender, their posterior femora much exceeding the abdomen even in the female, and the posterior tibiæ are furnished with 17 to 20 rather small spines. The ovipositor is moderately exerted and the last ventral segment of the male is acutely conical.

*Syrbula*, Stål, 1873. Recen. Orth., I, 90.

*Syrbula*, Bruner, 1893. Rev. Sys. Orth., 119.

*Oxycoryphus*, Sauss., 1861. Orth. Nov. Am., II, 16.

In part, *Stenobothrus*, Thos., 1873. Syn. Acrid. N. Am., 80.

This distinct North American genus contains four species as now determined, all of them being southern, though *S. admirabilis* extends as far north as northern Illinois.

#### KEY TO SYRBULA, Stål.

- A.<sup>1</sup> Median carina cut by two sulci . . . 1. — *Montezuma*, Sauss.
- A.<sup>2</sup> Median carina cut by the last sulcus only.
- B.<sup>1</sup> Lateral lobes of the pronotum either plainly punctate or furnished with elongate rugæ behind the principal sulcus.
- C.<sup>1</sup> Lateral carinæ of the pronotum generally sinuate. Posterior femora and tibiæ unusually long and slender, the latter with 19 (female) to 21 (male) spines on the outer edge . . . . . 2. — *Admirabilis*, Uhler.
- C.<sup>2</sup> Lateral carinæ of the pronotum strongly sinuate. Posterior femora and tibiæ moderately slender, but not longer than usual, the latter with 17 (male) spines on the outer edge . 3. — *Acuticornis*, Bruner.

B.<sup>2</sup> Lateral lobes of the pronotum smooth behind the principal sulcus.....4.—*Fuscovittata*, Thos.

1. SYRBULA MONTEZUMA, Sauss.

*Oxycoryphus montezuma*, Sauss., 1861. Orth. Nov. Am., Ser. II, 18.

*Oxycoryphus montezuma*, Walk., 1870. Cat. Derm. Salt., IV, 787.

*Oxycoryphus montezuma*, Thos., 1873. Syn. Acrid. N. Am., 204.

*Syrbula montezuma*, Stål, 1873. Rec. Orth., I, 102.

**Hab.** Mexico (Saussure).

This species is included in this genus on the authority of Stål as it is unknown to me. I am not inclined to think it is synonymous with *Admirabilis*, as has been suggested by Thomas and Bruner, because Stål probably knew the species and considered it distinct, and because there is at least one character given by Saussure which can not apply to *Admirabilis*. It is true that there is evidently a misconception in the text at the point referred to (pronoti carinae tres sulci 2 sejunctis), but whether the figure 2 be translated by a cardinal as sulci would require, or by an ordinal as Thomas has assumed, the difficulty remains that in *Admirabilis* the median carina is cut but once and that very distinctly by the third sulcus.

2. SYRBULA ADMIRABILIS, Uhler.

*Stenobothrus admirabilis*, Uhler, 1864. Proc. Ent. Soc. Phil., II, 553.

*Stenobothrus admirabilis*, Thos., 1873. Syn. Acrid. N. Am., 84.

*Stenobothrus admirabilis*, Thos., 1876. Bul. I, Ill. Mus. Nat. Hist., Art. VII, 61.

*Stenobothrus admirabilis*, Bruner, 1883. 3rd Rept. U.S. Ent. Com., 55.

*Syrbula admirabilis*, Bruner, 1877. Can. Ent., IX, 144.

*Syrbula admirabilis*, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., Vol. I, No. 4, 131.

*Syrbula admirabilis*, McNeill, 1891. Psyche, VI, 65.

*Syrbula admirabilis*, Blatchley, 1891. Can. Ent., XXIII, 76.

*Syrbula admirabilis*, Garman, 1894. 6th Ann. Rept. Ky. Ag. Ex. Sta., 9.

*Syrbula admirabilis*, Beutenmüller, 1894. Desc. Cat. Orth., 292.

*Syrbula leucocera*, Stål, 1873. Rec. Orth., I, 102.

*Syrbula leucocera*, Thos., 1875. Rept. Geol. and Geog. Surv. W. 100 Mer., V Zool, 1869.

*Syrbula leucocera*, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., Vol. I, No. 4, 131.

? *Syrbula montezuma*, Townsend, 1893. Ins. Life, VI, 31.

**Hab.** United States east of the Rocky Mountains, extending as far north as Nebraska and Northern Illinois and on the Atlantic coast to Maryland. If the species determined by Bruner and reported by Townsend is *admirabilis*, it is also found between the Rocky and the Sierra Nevada Mountains. The United States Museum contains numerous specimens from Illinois, Missouri, Arkansas, Texas, and Georgia.

3. *SYRBULA ACUTICORNIS*, Bruner. Fig. 10, 10b.

*Syrbula acuticornis*, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 55.

**Hab.** Southwestern Texas (Bruner): Fort Grant, Arizona. The National Museum contains several specimens (males) from the last-mentioned locality which have been doubtfully referred to *S. fusca-vittata*, Thos. They do not fit Thomas' description of that species, however, in having the lateral lobes of the pronotum not smooth behind the principal sulcus, but punctate. I think there is little doubt but the specimens in question belong to Bruner's species. The National Museum also contains two of Bruner's types (females).

4. *SYRBULA FUSCA-VITTATA*, Thos.

*Syrbula fusca-vittata*, Thos., 1875. Rept. Geol. and Geog. Surv. W. 100 Mer., V, Zool., 870, pl. xlv, fig. 7.

**Hab.** Lower Arizona (Thomas).

I am not acquainted with this species; it may be that it is identical with Bruner's *acuticornis*.

XI. **AMPHITORNUS**, n. gen. Fig. 11.

Vertex a little declivent, advanced in front of the eyes less than half the distance between the eyes, convex, with slight sulci on either side of the median carina. Lateral carinae are scarcely at all perceptible. Tempora rather broad, not at all foveolate, and no more clearly separated from the vertex than from the front. Frontal costa rather broad, not sulcate, barely depressed at the ocellus with the margins very moderately divergent below. The antennae are distinctly shorter (female) or not longer (male) than the head and pronotum, flattened in both sexes, more or less acuminate in the female, linear in the male. Pronotum with the disk well rounded and the lateral carinae, if present at all, extremely faint and not interfering at all with

rounded outline of the humeral angles. The median carina is distinct and accompanied by more or less distinct supplementary carinæ on the disk. All of these are cut by the last principal sulcus only, a little or considerably behind the middle. The posterior angle of the disk is moderately rounded. The lateral lobes of the pronotum are a little higher than long with the anterior margin strongly oblique, the posterior margin perpendicular and the lower margin slightly angulate. The mesosternal lobes are separated by a space broader than (female) or as broad as long (male), and the metasternal lobes by a space longer than broad (female) or very nearly approximate (male). The tegmina are well developed, with the scapular area of the male expanded, hyaline and filled with rather prominent cross veins. The discoidal area has no intercalary vein, and the dividing is soon united with the plicate vein. The posterior femora are banded with fuscus on the upper and inner faces. The upper valves of the ovipositor are included, the lower valves slightly exerted. The posterior tibiæ are bluish, with the apical inner spur sub-equal to the one behind it, much less than twice as long.

This genus includes two western species, it is closely related to the following genus and less intimately to *Eritettix*. From the last-mentioned genus it is easily distinguished by the absence of lateral carinæ upon the top of the head, and the median carina except at the vertex, by the absence of the club to the antennæ, by the rounded disk of the pronotum and the obsolete lateral carinæ, by the banded hind femora, the blue hind tibiæ with sub-equal inner apical spurs, and by the unspotted tegmina.

#### KEY TO AMPHITORNUS, n. gen.

- A.<sup>1</sup> Median carina cut very little behind the middle. . . . . 1.—*Bicolor*, Thos.  
 A.<sup>2</sup> Median carina cut decidedly behind the middle. 2.—*Ornatus*, n.sp.

#### 1. AMPHITORNUS BICOLOR, Thos. Fig. 11a, 11b.

*Stenobothrus bicolor*, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 465.

*Stenobothrus bicolor*, var. a., Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 465.

*Stenobothrus coloradus*, Thos., 1873. Syn. Acrid. N. A., 82.

*Stenobothrus coloradus unicolor*, Thos., 1873. Syn. Acrid. N. Am., 83.

*Stenobothrus coloradus*, Thos., 1876. Proc. Dav. Acad. Nat. Sci., I, 251.

*Stenobothrus coloradus*, Bruner, 1883. 3rd. Rept. U. S. Ent. Com., 55.

*Stenobothrus coloradus*, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, No. 4, 131.

*Stenobothrus coloradus*, Bruner, 1885. Rept. Com. Agr., 307.

**Hab.** Montana, Wyoming, and Colorado, east of the Rocky Mountains, Kansas and Nebraska.

This, like *Opeia obscurus*, Thos., is a species of the great plains. It is reported by Bruner as very common in the Yellowstone Valley. The National Museum contains 'Thomas' types and specimens from Nebraska, Wyoming, Colorado, and Montana.

2. AMPHITORNUS ORNATUS, n. sp.

*Stenobothrus coloradus*, Koebele, 1890. Bul. 22, Div. Ent., 94.

This species is closely allied to the preceding, but the following differences appear: The head and pronotum in this species are longer, and the face is distinctly more oblique in both sexes. The antennæ of the female are more depressed and distinctly acuminate. The median carina is cut decidedly behind the middle. The colors are brighter and more strongly contrasted. The posterior tibiæ are bright blue.

Described from several specimens from Los Angeles, California, which now belong to the United States National Museum.

XII. **AKENTETUS**, n. gen. Fig. 12.

This genus is closely related to *Amphitornus*. It differs in the somewhat longer and considerably deeper sculpturing of the head, but especially in the structure of the pronotum which is nearly plain above with the lateral carinæ faint except upon the anterior part of the prozone and the metazone and considerably divergent from the middle sulcus to the posterior margin. These are cut by all three transverse sulci. The median carina is faint and cut near the middle by the principal sulcus only. There are no traces of supplementary carinæ. The color is nearly uniform brown.

This genus contains a single species found in Colorado.

**AKENTETUS UNICOLOR**, n. sp. Fig. 12a, 12b.

Length (male) ..... 18.5 mm.  
Tegmina ..... 16 mm.  
Post. Fem. .... 12.5 mm.

Color dark, dull brown with a narrow stripe of fuscous, which is not at all conspicuous on account of the dark ground color, extending from the upper margin of the eye along the lateral lobes of the pronotum just outside of the lateral carinæ. The posterior femora have the outer face marked with three distinct black bands and the knee is black. All these black marks are extended across the upper face and upon the inside. The posterior tibiæ are bluish.

Described from a single male from Colorado.

### XIII. **AMBLYTROPIDIA**, Stål. Fig. 13.

Vertex extended considerably in front of the eyes, plainly declivent and roundly united with the front from which it is separated by lateral carinæ which are almost obsolete or moderately distinct. It is convex and shallowly or scarcely sulcate with a plain median carina. The lateral foveolæ are wanting. The frontal costa is plain or sulcate with elevated lateral carinæ. The face seen from the side is nearly straight. The antennæ are filiform or slightly enlarged apically and heavy, scarcely as long as the head and pronotum. The pronotum has the disk plain with the carinæ, more especially the median, distinct and parallel or the lateral slightly divergent. The median carina is cut near or distinctly behind the middle and the metazone is sharply but very obtusely angulate. The lateral lobes of the pronotum are at least as high as broad with the anterior border moderately oblique, the posterior sub-vertical and the lower a little descending posteriorly, more decidedly ascending anteriorly. The lobes of the mesosternum are separated by a space about as broad as long (male and female) and the metasternal lobes are contiguous behind. The tegmina and wings are well developed with the scapular area of the former not expanded nor hyaline nor regularly veined. The posterior femora are decidedly heavy with the base unusually convex on the outer face. The valves of the ovipositor are exerted.

*Amblytropidia*, Stål, 1873. Recen. Orth., I, 93.

*Amblytropidia*, Bruner, 1893. Rev. Syst. Orth., 120.

This American genus contains three species, *A. ferruginea*, Stål, from Brazil and the two enumerated below from North America.

#### KEY TO AMBLYTROPIDIA, Stål.

- A.<sup>1</sup> Median carina of the pronotum cut in the middle. Dorsum of the abdomen brownish.....1.—*Occidentalis*, Sauss.

- A.<sup>2</sup> Median carina of the pronotum cut much behind the middle.  
Dorsum of the abdomen reddish orange..2.—*Auriventris*, Bruner.

1. AMBLYTROPIDIA OCCIDENTALIS, Sauss. Fig. 13a, 13b.

*Stenobothrus occidentalis*, Sauss., 1861. Orth. Nov. Am., Ser. II, 19.  
*Stenobothrus occidentalis*, Walk., 1870. Cat. Derm. Salt., IV, 755.  
*Amblytropidia subhyalina*, Scud., 1875. Cent. Orth., 23.  
*Amblytropidia subhyalina*, Scud., 1877. Ent. Notes, VI, 29.  
*Amblytropidia subhyalina*, Bruner, 1883. 3rd Rept. Ent. Com., 58.  
*Amblytropidia subhyalina*, Schufeldt, 1884. Proc. U. S. Nat. Mus., VII, 332.

*Chloëaltis* (*Amblytropidia*) *subhyalina*, Provancher, 1877. Faune Entom. du Can., 44.

**Hab.** The Gulf States of the United States north of Tennessee and Georgia and west to Colorado and Arizona. Abbé Provancher implies that a specimen of this species in his collection was found in Canada. Its occurrence there seems improbable.

2. AMBLYTROPIDIA AURIVENTRIS, Bruner.

*Amblytropidia auriventris*, Bruner.

**Hab.** Orizaba, Mexico.

XIV. CHLOËALTIS, Harr. Fig. 14.

Vertex triangular, a little declivent, not extending in front of the eyes as much as the distance between the eyes, convex, more or less sulcate, with the lateral carinæ little elevated and the median carina slight but never entirely wanting. The lateral foveolæ are wanting. The frontal costa is more or less rounded above the ocellus, plain or very faintly sulcate below with the sides sub-parallel. The antennæ are decidedly flattened at the base and much longer than the head and pronotum together, in the male as long as the hind femora. The face seen from the side is nearly straight. The pronotum has the disk plain with the three carinæ equally distinct and cut much behind the middle with the last transverse sulcus. The lateral carinæ are plainly (male) or strongly (female) curved. The posterior margin of the meta-zone is straight or gently curved, not angulate. The lateral lobes of pronotum are longer than high, with the anterior and posterior margins straight and strongly and equally oblique, and with the lower margins horizontal or slightly descending posteriorly, more decidedly

ascending anteriorly. Mesosternal lobes separated by a space much broader than long, the metasternal lobes by a space broader than long (female) or about as broad as long (male). The tegmina are generally abortive (female) or well developed (male). The scapular area is unusually expanded, especially near and beyond the middle in the male (and in the female to a less extent when the tegmina are not abortive), and is filled with a series of strong oblique cross-veins. The discoidal is as broad as the ulnar area, and the intercalary vein is present. The posterior femora are rather slender or moderately robust and more or less distinctly banded above. The posterior tibiae have the apical spurs on the inside about equal.

This North American genus contains two species, one from the north-eastern and one from the north-western United States.

In part, *Locusta* (*Chloëaltis*), Harr., 1852. Treat. Ins. Inj. to Veg., 160.

In part, *Locusta* (*Chloëaltis*), Harr., 1862. Treat. Ins. Inj. to Veg., 184.

In part, *Chloëaltis*, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 456.

In part, *Chloëaltis*, Thos., 1880. 9th Rept. Ins. Ill., 84.

In part, *Chloëaltis*, Brunner, 1893. Rev. Sys. Orth., 119.

*Chloëaltis*, Morse, 1896. Psyche, VII, 327, fig. 11, 11a, and 419.

In part, *Chrysochraon*, Thos., 1873. Syn. Acrid. N. Am., 74.

In part, *Stenobothrus*, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 456.

In part, *Truxalis*, Thos., 1876. Bul. I, Ill. Mus. Nat. Hist., 61.

#### KEY TO CHLOEALTIS, Harr.

- A.<sup>1</sup> Posterior margin of the disk of the pronotum straight, lateral lobes of the pronotum of the male black... 1. — *Conspersa*, Harr.  
 A.<sup>2</sup> Posterior margin of the disk of the pronotum obtusely rounded, lateral lobes of the pronotum of the male not black..... 2. — *Abdominalis*, Thos.

#### 1. CHLOEALTIS CONSPERSA, Harr. Fig. 14a, 14b.

*Locusta* (*Chloëaltis*) *conspersa*, Harr., 1852. Treat. Ins. Inj. Veg., 160.

*Locusta* (*Chloëaltis*) *conspersa*, Harr., 1862. Treat. Ins. Inj. Veg., 184.

*Chloëaltis* *conspersa*, Scud., 1862. Can. Nat., VII, 286.

*Chloëaltis* *conspersa*, Scud., 1862. Journ. Bost. Soc. Nat. Hist., VII, 455.

*Chloëaltis conspersa*, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 145.

*Chloëaltis conspersa*, S. I. Smith, 1872. Rept. Sec. Agr. Conn., 375.

*Chloëaltis conspersa*, Scud., 1874. Fin. Rept. Geol. N. H., I., 570, fig. 55-56.

*Chloëaltis conspersa*, Scud., 1875. Brit. N. Am. Bound. Com., 286.

*Chloëaltis conspersa*, Fernald, 1887. Orth. N. E., 36.

*Chloëaltis conspersa*, Caulfield, 1887. 18th Rept. Ent. Soc. Ont., 70.

*Chloëaltis conspersa*, Davis, 1889. Ent. Am., V, 78 and 81.

*Chloëaltis conspersa*, McNeill, Psyche, VI, 65.

*Chloëaltis conspersa*, Scud., 1893. 23rd Ann. Rept. Ent. Soc. Ont., 75, fig. 50 and 51.

*Chloëaltis conspersa*, Garman, 1894. 6th Ann. Rept. Ky. Agr. Ex. Sta., 8.

*Chloëaltis conspersa*, Morse, 1894. Psyche, 13 and 104.

*Chloëaltis conspersa*, Blatchley, 1894. Can. Ent., XXVI, 222.

*Chloëaltis conspersa*, Morse, 1896. Psyche VII, 327, fig. 11, 11a, and 419.

*Stenobothrus conspersus*, Walk., 1870. Cat. Derm. Salt., IV, 755.

*Chrysochraon conspersum*, Thos., 1873. Syn. Acrid. N. Am., 76.

*Chrysochraon conspersum*, Bruner, 1877. Can. Ent., IX, 144.

*Chrysochraon conspersum*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.

*Chrysochraon conspersum*, Blatchley, 1891. Can. Ent., XXIII, 75.

*Chrysochraon conspersum*, Osborn, 1892. Proc. Iowa Acad. Sci., 1890-91, 4.

*Truxalis conspersa*, Thos., 1876. I, Bul. Ill. Mus. Nat. Hist., 61.

*Locusta (Chloëaltis) abortiva*, Harr., 1852. Treat. Ins. Inj. Veg., 160.

*Locusta (Chloëaltis) abortiva*, Harr., 1862. Treat. Ins. Inj. Veg., 184.

*Stenobothrus melanopleurus*, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 456.

*Stenobothrus melanopleurus*, Walk., 1870. Cat. Derm. Salt., IV, 754.

**Hab.** Canada as far north as the shores of Lake Winnipeg; United States, Nebraska to New England and south to Ohio, Indiana, and Illinois.

This species has only been reported once as far west as Nebraska (Bruner, 1877), and it is not unlikely that this reference was mistaken.

## 2. CHLOËALTIS ABDOMINALIS, Thos.

*Chrysochraon abdominalis*, Thos., 1873. Syn. Acrid. N. Am., 74.

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*Chrysochraon abdominalis*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.

**Hab.** Montana.

The types are in the National Museum. The species has not been reported since it was named by Thomas.

#### XV. **DICHROMORPHA**, Morse. Fig. 15.

Vertex much shorter than broad, somewhat declivent, convex, but more or less sulcate behind the distinct elevated lateral carinæ. These are straight or gently curved and meet at an angle of 90 degrees or more in a blunt point. The median carina is entirely wanting, as are the lateral foveolæ. The frontal costa is sulcate above and below the ocellus with the sides gently divergent downward, more or less constricted just below the ocellus and near the vertex. The face seen from the side is nearly straight. The antennæ are a little longer (male) or scarcely so long as (female) the head and pronotum. The disk of the pronotum is plain with the three carinæ very nearly straight and parallel. All are cut distinctly behind the middle by the very faint principal sulcus. The first and second transverse sulci are not visible upon the disk. The lateral lobes of the pronotum are perpendicular, longer than high, with the anterior and posterior margins strongly oblique, the latter plainly sinuate and the lower margin a little descending posteriorly, more strongly ascending and sinuate anteriorly. The lobes of the mesosternum are separated by a space broader than long (female) or as broad as long (male). The lobes of the metasternum are separated in the female by a space as long as broad, in the male they are contiguous. The tegmina are generally abortive, sometimes well developed, in which case the scapular area is not expanded. The anal field of the tegmina meets the discoidal field at an angle. The posterior femora are stout and not banded. The posterior tibiæ are obscurely colored with the apical spurs on the inner side not very unequal. The valves of the ovipositor are moderately exerted.

*Dichromorpha*, Morse, 1896. *Psyche*, VII, 326, fig. 1, 7, 7a, 7b.

In part, *Chloëaltis*, Scud., 1862. *Journ. Bost. Soc. Nat. Hist.*, VII, 445.

In part, *Chloëaltis*, Bruner, 1893. *Rev. Syst. Orth.*, 119.

In part, *Opsomala*, Thos., 1865. *Trans. Ill. Agr. Soc.*, 451.

In part, *Chrysochraon*, Thos., 1873. *Syn. Acrid. N. Am.*, 75.

In part, *Truxalis*, Stål, 1873. *Recen. Orth.*, I, 92.

In part, *Truxalis*, Thos., 1876. Bul. Ill. Mus. Nat. Hist., I, 61.

KEY TO DICHROMORPHA, Morse.

- A.<sup>1</sup> Lateral carinae of the pronotum perceptibly sinuate about the middle and a little less distant at this point than on the metazone.  
..... 1.—*Viridis*, Scud.  
A.<sup>2</sup> Lateral carinae of the pronotum perceptibly arcuate about the middle and more distant at this point than on the metazone ...  
..... 2.—*Brunnea*, Scud.

1. DICHROMORPHA VIRIDIS, Scud.

- Chloëaltis viridis*, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 455.  
*Chloëaltis viridis*, S. I. Smith, 1872. Rept. Sec. Agr. Conn., 374.  
*Chloëaltis viridis*, Scud., 1877. Ent. Notes, VI, 29.  
*Chloëaltis viridis*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 58.  
*Chloëaltis viridis*, Fernald, 1887. Orth. New Eng., 36.  
*Chloëaltis viridis*, Davis, 1889. Ent. Am., V, 81.  
*Chloëaltis viridis*, McNeill, 1891. Psyche, VI, 64.  
*Chloëaltis viridis*, Garman, 1894. 6th Ann. Rept. Ky. Agr. Ex. Sta., 8.  
*Chloëaltis viridis*, Morse, 1894. Psyche, VII, 14.  
*Chloëaltis viridis*, Beutenmüller, 1894. Desc. Cat. Orth., 292, pl. vii, fig. 10.  
*Chloëaltis viridis punctulata*, Beutenmüller, 1894. Desc. Cat. Orth., 292.  
*Stenobothrus viridis*, Walk., 1870. Cat. Derm. Salt., IV, 755.  
*Chrysochraon viridis*, Thos., 1873. Syn. Acrid. N. Am., 75.  
*Chrysochraon viridis*, Scud., 1874. Fin. Rept. Geol. N. H., 372.  
*Chrysochraon viridis*, Bruner, 1877. Can. Ent., IX, 144.  
*Chrysochraon viridis*, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, No. 4, 131.  
*Chrysochraon viridis*, Blatchley, 1891. Can. Ent., XXIII, 75.  
*Chrysochraon viridis*, J. B. Smith, 1892. Bul. 90, N. J. Agr. Exp. Sta., 31, pl. i, fig. 5.  
*Chrysochraon viridis*, Osborn, 1892. Proc. Iowa Acad. Sci., 1890, 914.  
*Chrysochraon viridis*, Blatchley, 1894. Can. Ent., XXVI, 221.  
*Truxalis viridis*, Thos., 1876. Bul. Ill. Mus. Nat. Hist., I, 61.  
*Dichromorpha viridis*, Morse, 1896. Psyche, VII, 326, fig. 7, 7a, 7b.  
*Chloëaltis punctulata*, Scud., 1862. Journ. Bos. Soc. Nat. Hist., VII, 455.

- Chloëaltis punctulata*, Fernald, 1887. n Orth. New Eng., 36.  
*Chloëaltis punctulata*, Bruner, 1885. Rept. Com. Agr., 307.  
*Chloëaltis punctulata*, Morse, 1894. Psyche, VII, 14, 104.  
*Stenobothrus punctulata*, Walk., 1870. Cat. Derm. Salt., IV, 755.  
*Chrysochraon punctulatum*, Thos., 1873. Syn. Acrid. N. Am., 76.  
*Chrysochraon punctulatum*, Bruner, 1877. Can. Ent., IX, 144.  
*Chrysochraon punctulatum*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.  
*Opsomala brevipennis*, Thos., 1865. Trans. Ill. Agr. Soc., V, 451.  
*Truxalis angusticornis*, Stål, 1873. Recen. Orth., I, 105.  
*Truxalis angusticornis*, Thos., 1875. Rept. Geog. and Geol. Surv. W. 100 Mer., V, Zool., 871.

**Hab.** The United States east of the Rocky Mountains except Texas and the extreme Southwest.

This is one of the commonest and most widely spread species in North America.

2. *DICHROMORPHA BRUNNEA*, Scud. Fig. 15a, 15b.

- Chloëaltis brunnea*, Scud., 1875. Cent. of Orth., 22.  
*Chloëaltis brunnea*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 58.

**Hab.** Florida (Scudder).

I have seen a typical specimen from Scudder's collection.

XVI. *CLINOCEPHALUS*, Morse. Fig. 16.

Vertex horizontal, triangular, sulcate, without a median carina, much shorter than the distance between the eyes, with strongly elevated lateral carinæ. Lateral foveolæ wanting. Frontal costa acuminate above, sulcate throughout, with the heavy lateral carinæ regularly divergent below. Face a very little arcuate. The antennæ a little longer than the head and pronotum (male), sub-filiform, with the seventh to eleventh joints expanded laterally on the inner side so as to make them obscurely serrate at that point. The pronotum has the disk nearly plain with the three carinæ heavy and distinct and plainly cut much behind the middle by the principal sulcus only. The lateral carinæ are parallel on the prozone, very slightly divergent on the metazone. The posterior margin of the metazone is very gently arcuate. The lateral lobes of the pronotum are slightly convex above with the anterior margin straight and strongly oblique, the posterior margin oblique and decidedly sinuate above the lower angle and the lower

margin decidedly angulate in the middle. The lobes of the mesosternum are separated by a space longer than broad (male). The metasternal lobes are contiguous. The tegmina and wings are well developed and not longer than the abdomen. In both the ulnar area is very greatly expanded in the middle and the discoidal area is narrow. The posterior femora are not banded. The posterior tibiæ have the apical spurs on the inner side not very unequal. The anterior and middle femora are somewhat inflated.

*Clinocephalus*, Morse, 1896. Psyche, VII, 326, fig. B, Ba.

1. CLINOCEPHALUS ELEGANS, Morse. Fig. 16a.

*Clinocephalus elegans*, Morse, 1896. Psyche, VII, 326, fig. B, Ba.

**Hab.** Long Island, New Jersey, Maryland, Georgia, (Morse).

#### XVII. ORPHULA, Stål. Fig. 17a, 17b, 17c, 17d.

Vertex nearly horizontal, never extending in front of the eyes a distance greater than its own width, always more or less sulcate, with or without a faint median carina. The lateral foveolæ are obsolete or distinct, elongate triangular, or linear, not visible from above. The frontal costa is plain or sulcate with the sides nearly straight and very moderately divergent. The face is nearly straight or a little arcuate, never at all sinuate. The antennæ are filiform, sometimes depressed and acuminate at the apex. The pronotum has the disk nearly plain, with the median carina cut in or behind the middle. The lateral carinæ are generally decidedly or strongly sinuate, rarely nearly straight and divergent from the front border, or from the first and second sulcus. Very rarely they are nearly parallel. The lateral lobes of the pronotum have the anterior border decidedly oblique and straight or a little arcuate, the posterior border is less oblique and more or less sinuate and the lower border is decidedly angulate in the middle. The mesosternal lobes are separated by a space broader than long (female) or about as broad as long (male) and the metasternal lobes by a space not broader than long (female) or they are contiguous (male). The tegmina and wings are well developed, a little shorter or much longer than the abdomen. The former are very narrow with the scapular area not more expanded in the male than in the female. The discoidal area is destitute of the intercalary vein and the ulnar area in the male is sometimes much widened and regularly reticulate. The posterior femora are moderately slender or rather heavy. The

apical spurs on the inner side of the posterior femora are never very unequal. The valves of the ovipositor are moderately exerted.

*Truxalis* (*Orphula*), Stål, 1873. Recen. Orth., I, 105.

In part, *Stenobothrus*, Scud., 1861. Jour. Bost. Soc. Nat. Hist., VII, 456.

In part, *Stenobothrus*, Thos., 1873. Syn. Acrid. N. Am., 80.

*Orphula*, Boliv., 1888. Ex. Mem. Soc. Zool. France, 27.

*Orphula*, Brunner. Rev. Sys. Orth., 119.

*Orphula*, Morse, 1896. Psyche, VII, 326, fig. 8, 10a.

This genus is given by Stål as a sub-genus of *Truxalis*. It was founded upon *T. pagana*, Stål, *T. plebeia*, Stål, *T. intricata*, Stål, and *Acridium punctatum*, De G. The first and third mentioned are South American species; the second is from Honolulu; and the fourth from Surinam, Rio Janeiro and Columbia. It is represented in North America and the West Indies by seven species.

#### KEY TO ORPHULA, Stål.

- A.<sup>1</sup> Discoidal field of the tegmina (female) scarcely narrowing distally where it is occupied nearly always by more than one row of cells and is little if any narrower than the ulnar area at its widest part. The ulnar area in the male is either divided into two series of cells by a more or less distinct false vein or it is irregularly reticulate, never occupied throughout with a single series of perpendicular or oblique cross-veins. The tegmina extend beyond the tips of the posterior femora always.
- B.<sup>1</sup> Antennæ very slender, very slightly depressed and not somewhat suddenly constricted near the tip and acuminate, as long as the head and pronotum even in the female. Lateral carinæ of the pronotum most nearly approximate at the second transverse sulcus.....1.—*Pelidna*, Burm.
- B.<sup>2</sup> Antennæ not very slender, strongly depressed, somewhat suddenly constricted near the apex and acuminate, shorter than the head and pronotum (female) or but little longer (male). Lateral carinæ of the pronotum most nearly approximate at the transverse sulcus.....2...—*Olivacea*, Morse.
- A.<sup>2</sup> Discoidal area of the tegmina of the female generally plainly narrowed distally where it is nearly always occupied by a single row of cells, and is plainly narrower than the ulnar area at its widest part. The ulnar area in the male is occupied by a single series of transverse veins. The tegmina rarely exceeding the abdomen (female) or the tip of the posterior femora (male).

- B.<sup>1</sup> Lateral carinæ sub-straight and parallel. . . . . 3.—*Decora*, n. sp.  
 B.<sup>2</sup> Lateral carinæ either strongly constricted, or if not they are strongly divergent on the metazone.  
 C.<sup>1</sup> Lateral carinæ more nearly approximate at the second sulcus than at the anterior margin of the pronotum. Posterior margin of the metazone gently angulate or obscurely rounded. Median carina cut decidedly behind the middle.  
 D.<sup>1</sup> Lateral foveolæ of the vertex generally very obscure, always triangular and basal. Head not very much shorter than the pronotum. Antennæ as long as (female) or longer than the head and pronotum and not acuminate at the apex. 4.—*Speciosa*, Scud.  
 D.<sup>2</sup> Lateral foveolæ of the vertex distinct and sub-linear. Head much shorter than the pronotum. Antennæ scarcely as long as (male) or much shorter than (female) the pronotum, and distinctly acuminate at the tip. . . . . 5.—*Tepanica*, Sauss.  
 C.<sup>2</sup> Lateral carinæ not more nearly approximate at any part of the pronotum than at the anterior margin.  
 D.<sup>1</sup> Median carina of the pronotum cut in the middle. Lateral carinæ of the pronotum gently divergent on the prozone, decidedly on the metazone. Posterior margin of the metazone strongly angulate. . . . . 6.—*Orizaba*, n. sp.  
 D.<sup>2</sup> Median carina of the pronotum cut behind the middle. Lateral carinæ parallel on the prozone. . . . . 7.—*Scudderi*, Boliv.  
 . . . . . 8.—*Punctata*, De Geer.

## I. ORPHULA PELIDNA, Burm.

Length (male) . . . . .	16	—19	mm.	(female) . . . . .	20	—24	mm.
Tegmina (male) . . . . .	14	—17.5	mm.	(female) . . . . .	18	—20	mm.
Antennæ (male) . . . . .	7	—10	mm.	(female) . . . . .	8.5	—10	mm.
Post. Fem. (male) . . . . .	9.5	—11	mm.	(female) . . . . .	12	—14	mm.

The scutellum does not extend in front of the eyes a distance equal to the width between the eyes, its sides meet in an angle a little greater (female) less (male) than a right angle, a sub-crescent shaped transverse sulcus extends from eye to eye, which is not interrupted by any trace of a longitudinal median carina. The lateral foveolæ are generally quite distinct and deep, elongate triangular in shape. The frontal costa is shallowly sulcate with the walls more divergent than in *speciosa*. The eyes are from one and one-half (female) to nearly twice (male) as long as the groove below the eye. The antennæ are little or not at all depressed, longer than the head and pronotum, decidedly

(male) or a little (female), with the segments near the middle from three to four times as long as wide. The pronotum has the three carinæ quite distinct, the two lateral carinæ being strongly divergent on the metazone and more nearly approximate upon the prozone than in *speciosa*. They are most nearly approximate at the second sulcus. All the carinæ are cut very near the middle by the principal transverse sulcus.

The tegmina surpass the femora slightly (female) or considerably (male). The ulnar area of the tegmina is usually little or no broader than the intercalary and the latter is occupied even distally by two or more rows of cells. The former is never, as in *speciosa*, occupied in the male by a single row of cells.

This species is extremely variable in color, but brown and fuscous are the predominant tints. In some specimens brown is replaced by various shades of green on the face, cheeks, occiput, disk and lower part of the lateral lobes of the pronotum, anal and costal fields of the tegmina. In these and other light colored specimens the fuscous stripe behind the eye is quite broad especially in the male; in many dark specimens, especially in the male, the fuscous stripe expands so as to cover nearly the whole of the lateral lobes of the pronotum; generally, however, there is to be seen more or less of lighter sometimes strongly contrasting color along the anterior and lower margins. The lateral carinæ are nearly always sharply outlined with yellowish brown or green which cuts the fuscous band on the metazone. The disk of the pronotum is sometimes dark except for a broad median light stripe. The tegmina are commonly brown and the whole radial field is usually mottled with lighter and darker brown or fuscous. The posterior femora are brown with the outer face more or less infuscated, sometimes with traces of transverse brown bands. The posterior tibiæ are greenish yellow or obscure brown or plumbeous with the darker basal half interrupted by a somewhat conspicuous light annulus a short distance below the knee.

When compared with *speciosus*, the color is more mottled, especially on the sides and in the radial field of the elytra and green specimens are much less common.

This species can be distinguished from *speciosus* by the length of the tegmina, by the fact that the antennæ are longer than the head and pronotum and little or not at all depressed, by the narrower ulnar area of the tegmina never (in the male) occupied by a single row of cells, by the more compressed prozone and by the absence of the faint

median carina present on the scutellum of *speciosa*. It is readily distinguished from *olivacea*, Morse by the antennæ which are not short and plainly depressed, with the apex acuminate, as in that species, by the lateral carinæ which are convergent only to the first sulcus in *olivacea* instead of to the second as in this.

*Gomphocerus pelidnus*, Burm., 1838. Handb. Ent., II, 650.

*Gomphocerus pelidnus*, Walk., 1870. Cat. Derm. Salt., IV, 784.

*Gomphocerus pelidnus*, Thos., 1873. Syn. Acrid. N. Am., 95.

*Gomphocerus pelidnus*, Bruner, 1883. 3rd Rep. Ent. Com., 56.

*Gomphocerus pelidnus*, Morse, 1894. Psyche, VII, 104.

In part, *Gomphocerus maculipennis*, Scud., 1862. Bost. Jour. Nat. Hist., VII, 458.

*Gomphocerus maculipennis*, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 148.

*Gomphocerus maculipennis*, Walk., 1870. Cat. Derm. Salt., IV, 754.

*Gomphocerus maculipennis*, Thos., 1872. Syn. Acrid. N. Am., 86.

*Gomphocerus maculipennis*, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 430.

*Gomphocerus maculipennis*, S. I. Smith, 1872. Rept. Sec. Agr. Conn., 376.

*Gomphocerus maculipennis*, Scud., 1874. Fin. Rept. Geol. N. H., I, 373.

In part, *Gomphocerus maculipennis*, Thos., 1876. Bul. I, Ill. Mus. Nat. Hist., 61.

*Gomphocerus maculipennis*, Bruner, 1877. Can. Ent., IX, 144.

In part, *Gomphocerus maculipennis*, Thos., 1880. Rept. Nox. and Ben. Ins. Ill., 102.

In part, *Gomphocerus maculipennis*, Fernald, 1887. Orth. N. Eng., 37, fig. 7.

*Gomphocerus maculipennis*, Bruner, 1884. 3rd Rept. U. S. Ent. Com., 55.

*Gomphocerus maculipennis*, Schufeldt, 1884. Proc. U. S. Nat. Mus., VII, 332 and 335.

*Gomphocerus maculipennis*, J. B. Smith, 1884. Bul. 4, Div. Ent., 30.

*Gomphocerus maculipennis*, Bruner, 1885. Rept. Com. Agr., 307.

*Stenobothrus maculipennis*, Lintner, 1885. 2nd Rept. Ins. N. Y., 196.

*Stenobothrus maculipennis*, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., Vol. I, No. 4, 131.

*Stenobothrus maculipennis*, Davis, 1889. Ent. Am., V, 81.

*Stenobothrus maculipennis*, J. B. Smith, 1892. Bul. 90, N. J. Agr. Col. Ex. Sta., 31, pl. i, fig. 19.

*Stenobothrus maculipennis*, Morse, 1893. Psyche, VI, 479, fig. 4.

*Stenobothrus maculipennis*, Morse, 1894. Psyche, VII, 14 and 104.

*Stenobothrus maculipennis*, Garman, 1894. 6th Ann. Rept. Ky. Agr. Ex. Sta., 9.

*Stenobothrus propinquans*, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 461.

*Stenobothrus propinquans*, Walk., 1870. Cat. Derm. Salt., IV, 754.

*Stenobothrus propinquans*, Thos., 1873. Syn. Acrid. N. Am., 90.

*Stenobothrus propinquans*, Bruner, 1877. Can. Ent., IX, 144.

*Stenobothrus propinquans*, Provancher, 1877. Faune Ent. du Can., 43.

*Stenobothrus propinquans*, Scud., 1880. Second Rept. U. S. Ent. Com., 25.

*Stenobothrus*, sp., Uhler, 1877. Bul. U. S. Geol. and Geog. Surv. Terr., I, 792.

*Orphula maculipennis*, Bolivar, 1888. Ex. Mem. Soc. Zool. Fr., 27.

*Orphula maculipennis*, Morse, 1896. Psyche, VII, fig. 8-8 e.

Not *Stenobothrus maculipennis*, McNeill, 1891. Psyche, 65.

**Hab.** United States east of the Rocky Mountains. It is possible that the range of this species is greater than I have given it, but there has been so much uncertainty about the identity of this and allied species that it is impossible to know in all cases to what species the reference was made. I am inclined to think that the species generally referred to *propinquans* was generally a long-winged *æqualis* as the range of this species is much farther north than *maculipennis* which is a southern form. I think there is little doubt but that the synonymy given above is correct. Mr. Scudder compared his *propinquans* with Burmeister's type of *pelidna* and decided that the former was a synonym. I have a typical specimen of *propinquans* from Mr. Scudder's cabinet which he has labeled as equal to *pelidna*. A careful study of this specimen has convinced me that it is *maculipennis* and really much more typical than some of the southern forms. Furthermore, Scudder's description of *propinquans* applies about equally well to varieties of *maculipennis* and *æqualis* except in one particular. He says "Hind tibiæ plumbeus with a broad pale annulation at the base." This applies to most varieties of *maculipennis*, but I have never seen a specimen of *æqualis* in the hundreds I have in my collection which contains specimens from Iowa, Illinois, Missouri, Arkansas, Louisiana, Texas, Indiana, New York, Massachusetts, Connecticut, New Hamp-

shire, New Jersey, Maryland, Georgia, or in any collection to which I have had access, which had this mark.

2. ORPHULA OLIVACEA, Morse. Fig. 17 b.

*Stenobothrus olivaceus*, Morse, 1893. Psyche, VI, 479, fig. 182.

*Stenobothrus olivaceus*, Morse, 1894. Psyche, VII, 105.

*Stenobothrus olivaceus*, Morse, 1896. Psyche, VII, 327, fig. 10-10a.

**Hab.** Greenwich and Stanford, Connecticut, salt marshes (Morse).

3. ORPHULA DECORA, n. sp. Fig. 17 d.

Length (female).....	24	mm.
Tegmina.....	16	mm.
Head.....	3	mm.
Pronotum.....	4½	mm

Vertex broad but little advanced in front of the eyes, with a very low lateral carina, close to which is a shallow narrow sulcus and no median carina. The frontal costa is not at all sulcate, with the sides straight and very moderately divergent. The lateral foveolæ are elongate triangular and obscure. The face is arcuate. The antennæ are filiform, scarcely at all depressed. The pronotum has the median carina cut distinctly behind the middle. The lateral carinæ are nearly straight and parallel to the median carina, being quite parallel to the second sulcus and from that point barely divergent to the posterior margin of the metazone which is moderately angulate. The lobes of the mesosternum are separated by a space much broader than long. The lobes of the metasternum by a space much longer than broad. The tegmina are a little longer than the abdomen. The general color is testaceous, with the sides of the abdomen and an obscure stripe behind the eye a little darker, and the whole upper surface, including the anal and the costal fields of the tegmina green. The testaceous discoidal field is scarcely perceptibly maculate with very small spots.

Described from a single female which has lost its posterior femora and all of one and part of the other antenna.

This species is more closely related to *speciosa* than to any other of the Orphulæ. It is, however, readily distinguished by its much greater size approaching as it does very nearly *Dichromorpha viridis*, the female being a little less robust than in that species. It is also distinct in the structure of the pronotum in which the lateral carinæ are very nearly parallel and straight. The vertex is shorter and more rounded than in *speciosa* and there is no median carina. The metas-

ternal lobes are separated by a space about twice as long as broad in this species, in *speciosa* by a space about as long as broad. In some respects *decora* approaches *O. orizaba*, but it is readily distinguished from that species by the very much shorter vertex and the parallel lateral carinæ of the pronotum.

**Hab.** Fayetteville, Arkansas.

4. ORPHULA SPECIOSA, Scud. Fig. 17 c.

Length (male) . . . . .	14-15 mm.	(female) . . . . .	20-21 mm.
Tegmina . . . . .	12-13 mm.	. . . . .	12-16 mm.
Antennæ . . . . .	5-6 mm.	. . . . .	6 mm.
Post. Fem . . . . .	9 mm.	. . . . .	11 mm.

Scutellum of the vertex extending in front of the eyes much less than the distance between the eyes, with the sides meeting at an angle scarcely so little as a right angle even in the male. A somewhat crescent-shaped sulcus extends across the scutellum and this is interrupted by a faint median carina which extends backward more or less distinctly to the middle of the occiput. The lateral foveolæ are usually indistinct and triangular. The frontal costa has the sides slightly and somewhat regularly diverging from the vertex to the clypeus; it is furnished with coarse lateral walls which are moderately high or scarcely elevated. The eyes are distinctly less than twice as long as the groove below the eye. The antennæ are about as long as the head and pronotum; they are plainly depressed with the segments near the middle from one and one-half to twice as long as broad. The three carinæ of the pronotum are distinct raised lines, cut slightly behind the middle by the principal sulcus. The lateral carinæ are gently sinuate and convergent to the second sulcus on the prozone and only slightly divergent on the metazone.

The tegmina are rarely longer than the abdomen in the female and they very rarely surpass the knees in the male. The ulnar area is usually twice as wide as the intercalary area in the middle of the elytra and is furnished with one (male) or two (female) rows of cells. The intercalary area has but a single row of cells at the distal end.

The color is extremely variable. Some specimens are a nearly uniform dark brown; lighter colored specimens have the ground color any shade of brown or green, sometimes varied with rose, with a rather broad fuscous stripe extending from the eye across the upper margin of the lateral lobes of the pronotum, on the metazone crossing the lateral carinæ and edging the disk. In many specimens the lateral carinæ

are outlined with a lighter color. The elytra may be (*a*) nearly uniform brown; (*b*) nearly uniform green, except the radial field, which is more or less completely brown or fuscous with a single row of darker spots extending through the discoidal area to or beyond the middle of the tegmina; (*c*) the anal field concolorous with the occiput and disk of the pronotum, and the costal field green or some shade of brown different from that of the anal field.

The posterior femora are greenish or brown, with the outer face more or less infuscated but never plainly banded.

The posterior tibiae are dull brown, yellowish without any pale annulation near the base.

This is a common or abundant species from the Yellowstone Valley to Maine. In Northern Illinois it is confined to the tops and sides of the hills. In suitable situations (somewhat dry pasture lands) it is not uncommon as far south as Kansas and North-west Arkansas, and I have found it common on the hills about Shreveport, La.

I have examined Mr. Scudder's type of *S. speciosus* and *S. gracilis* and I think there is no doubt of their specific identity with *S. æqualis*. I have also a specimen of *S. bilineatus* (Scud.) from Dr. Scudder's cabinet, and I think there is no reasonable doubt of its identity with the above-named species.

*Stenobothrus speciosus*, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 458.

*Stenobothrus speciosus*, Walk., 1870. Cat. Derm. Salt., IV, 754.

*Stenobothrus speciosus*, Thos., 1873. Syn. Acrid. N. Am., 86.

*Stenobothrus speciosus*, Bruner, 1883. 3rd Rept. U.S. Ent. Com., 55.

*Stenobothrus æqualis*, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 459.

*Stenobothrus æqualis*, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 148.

*Stenobothrus æqualis*, Walk., 1860. Cat. Derm. Salt., IV, 754.

*Stenobothrus æqualis*, Scud., 1874. Fin. Rept. Geol. N. H., 373.

*Stenobothrus æqualis*, Bruner, 1877. Can. Ent., IX, 144.

*Stenobothrus æqualis*, Bruner. 3rd Rept. Ent. Com., 55.

*Stenobothrus æqualis*, Lintner, 1885. 2nd Rept. Ins. N. Y., 196.

*Stenobothrus æqualis*, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., 131, Vol. I, No. 4.

*Stenobothrus æqualis*, Bruner, 1885. Rept. Com. Agr., 307.

*Stenobothrus æqualis*, Bruner, 1887. Rept. Com. Agr., 167.

- Stenobothrus æqualis*, J. B. Smith, 1892. Bul. 90, N. J. Agr. Col. Ex. Sta., 31.
- Stenobothrus æqualis*, Osborn, 1892. Proc. Iowa Acad. Sci. 1890-91, 4.
- Stenobothrus æqualis*, Morse, 1893. Psyche, VI, 476, figs. 5 and 6.
- Stenobothrus æqualis*, Morse, 1894. Psyche, VII, 14 and 104.
- Stenobothrus bilineatus*, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 460.
- Stenobothrus bilineatus*, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 148.
- Stenobothrus bilineatus*, Walk., 1870. Cat. Derm. Salt., IV, 754.
- Stenobothrus bilineatus*, Thos., 1873. Syn. Acrid. N. Am., 90.
- Stenobothrus bilineatus*, Bruner, 1883. 3rd Rept. U.S. Ent. Com., 55.
- Stenobothrus bilineatus*, Morse, 1894. Psyche, VII, 104.
- Stenobothrus gracilis*, Scud., 1872. Fin. Rept. U.S. Geol. Surv. Neb., 250.
- Stenobothrus gracilis*, Thos., 1872. Pelim. Rept. U. S. Geol. Surv. Mont., 430.
- Stenobothrus gracilis*, Thos., 1873. Syn. Acrid. N. Am., 94.
- Stenobothrus gracilis*, Bruner, 1877. Can. Ent., IX, 144.
- Stenobothrus gracilis*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.
- Stenobothrus gracilis*, Bruner, 1885. Rept. Com. Agr., 307.
- Stenobothrus maculipennis*, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 148.
- Stenobothrus maculipennis*, Thos., 1876. Bul. I, Ill. Mus. Nat. Hist., 61.
- Stenobothrus maculipennis*, McNeill, 1891. Psyche, VI, 65.
- Orphula æqualis*, Bolivar, 1888. Ex. Mem. Soc. Zool. France, 27.
- Orphula æqualis*, Morse, 1896. Psyche, VII, 326, figs. 9, 9c.

5. ORPHULA TEPANICA (?), Sauss. Fig. 17 a.

Length (male) . . . . .	16 mm.	(female) . . . . .	20 mm.
Tegminæ . . . . .	12 mm.	. . . . .	14 mm.
Antennæ . . . . .	5 mm.	. . . . .	5 mm.
Post. Fem. . . . .	9 mm.	. . . . .	12 mm.

Vertex with a distinct but shallow crescent-shaped foveola with the lateral carinæ sharp and elevated and meeting in a nearly sharp angle equal to (female) or less than (male) a right angle. Lateral foveolæ nearly linear and distinct. Frontal costa very slightly (female) or moderately (male) sulcate with the sides regularly divergent below.

The antennæ are much (female) or little (male) shorter than the head and pronotum and they are acuminate at the tip. Pronotum much longer than the head with the median carina cut decidedly behind the middle, and the lateral carinæ slightly convergent to the second sulcus, more strongly divergent from that point to the posterior margin which is very obtusely angulate. The tegmina are about as long as (female) or a little longer than (male) the abdomen. The ulnar area of the tegmina is much narrower than in *speciosa*, and is occupied by very weak cross-veins. The color is greenish or testaceous, very similar to light colored specimens of *speciosa*.

This species is described from one male and four females from Siskiyou county and Los Angeles, California. They were collected by Mr. Coquillett and are now in the National Museum. It is impossible to be certain that the species just described is that named *tepanicus* by Saussure, as he gives a very imperfect description of the pronotum. As his description fits these specimens very well as far as it goes, and as the locality is not far removed, I have thought it best not to risk another synonym.

? *Stenobothrus tepanicus*, Sauss., 1861. Orth. Nov. Am., Sér. II, 21.

? *Stenobothrus tepanicus*, Thos., 1873. Syn. Acrid. N. Am., 206.

**Hab.** Mexico (Saussure); Los Angeles, Siskiyou county, California.

6. ORPHULA ORIZABÆ, n. sp. Fig. 17.

Length (male).....	13.5-14.5 mm.	(female).....	21 mm.
Tegmina .....	11-12.5 mm.	.....	14 mm.
Antennæ .....	5 mm.		
Post. Fem. ....	9 mm.	.....	11 mm.

The vertex is much produced in front of the eyes, being about as long as wide. It is very shallowly but broadly sulcate with the lateral carinæ very slight and scarcely elevated. The lateral foveolæ are triangular and obscure. The frontal costa is narrow and scarcely sulcate. The face is very slightly arcuate. The antennæ are very short, not equaling the head and pronotum even in the male. The pronotum is much longer than the head. The median carina is cut in the middle by the principal sulcus. The lateral carinæ are quite as distinct and sharp as the median, and they are divergent from almost the anterior margin to the posterior margin, which is strongly angulate. The tegmina exceed (male) or fall a little short (female) of the posterior femora. In some females the discoidal area has the distal portion a

little irregularly reticulate instead of the single series of cells usual in the division of the genus to which this species belongs. In the female, the ulnar area of the tegmina is less than twice as broad as the discoidal area and is occupied by a single series of weak and widely separated veins. The general color of the female is green with the under parts, the sides of the abdomen, and the inner and lower faces of the posterior femora and the posterior tibiæ brown; with the lateral carinæ of the pronotum whitish, accompanied by a very narrow black line, external on the prozone, internal on the metazone. The tegmina are grass-green and quite immaculate. The male is wholly testaceous, varying to dark brown except the upper surface of the head, the disk of the pronotum, and the anal field of the tegmina. The discoidal field is obsoletely maculate, with a few irregularly scattered small spots.

Described from two females from Mexico City, Mexico, and San Antonio, Texas, and four females from Mexico City and Tlalpam, Mexico. All of these specimens are in my collection except the specimen from San Antonio which is in the National Museum. The last mentioned specimen differs a little from the other male, especially in having the frontal costa plainly sulcate with heavy lateral carinæ and the ulnar area of the tegmina has more numerous cross-veins. I think, however, that it belongs to the species here described.

**Hab.** Mexico City, Tlalpam, Mexico, San Antonio, Texas.

7. ORPHULA SCUDDERI, Bolivar.

*Orphula scudderi*, Bol., 1888. Ex. Mem. Soc. Zool. France, 27.

**Hab.** Cuba (Bolivar).

8. ORPHULA PUNCTATA, De Geer.

*Acridium punctatum*, De Geer, 1773. Mem. Ins., III, 503, pl. XLII, fig. 12.

*Truxalis (orphula) punctata*, Stål, 1873. Recen. Orth., I, 106.

*Orphula punctata*, Brunner, 1893. Proc. Zool. Soc., Lond., XLI, 606.

**Hab.** Surinam (De Geer); Rio Janeiro, Columbia (Stål), Grenada, St. Vincent, and other islands of the West Indies (Brunner).

I am unacquainted with this species and the descriptions are too meagre to determine its position, but I include it here for the sake of completeness.

## SPECIES OF UNCERTAIN VALUE AND POSITION.

*Stenobothrus mexicanus*, Walk., 1870. Cat. Derm. Salt., IV, 756 (Oajaca).

*Stenobothrus decius*, Walk., 1870. Cat. Derm. Salt., IV, 757 (San Domingo).

*Stenobothrus arcatus*, Walk., 1870. Cat. Derm. Salt., IV, 761 (Honduras).

*Stenobothrus viridissimus*, Walk., 1870. Cat. Derm. Salt., IV, 761 (Honduras).

These species apparently belong to *Orphula*, but the descriptions are not good enough to enable one to certainly recognize such variable and closely allied forms. It is not unlikely that *mexicanus arcatus*, and *viridissimus* are synonyms of *O tepanicus*, Sauss., while *decius* is possibly *O speciosus*.

## XVIII. ALPHA, Brunner. Fig. 18.

Head about as long as the pronotum. Vertex almost horizontal, slightly declivent, sulcate with rather heavy lateral carinæ which meet in a blunt point and with no trace of a median carina. The lateral foveolæ are present but often not clearly separated from the front on account of the obsolescence of the lower carinæ. The frontal costa is narrow above the ocellus, sulcate and slightly acuminate below; its sides are more or less strongly divergent, while its lateral carinæ are heavy and distinct. The face seen from the side is strongly oblique and straight. The antennæ are somewhat (female) or much (male) longer than the head and pronotum. They are flattened basally and plainly acuminate. The disk of the pronotum is somewhat convex, with the median carina rather slight and cut by the distinct principal sulcus behind the middle. The lateral carinæ are scarcely distinguishable, even on the metazone, but they are replaced on the sides of the disk by distinct light-colored stripes which are strongly or very strongly sinuate, and divergent on the metazone. The metazone has its posterior margin gently rounded. The lateral lobes of the pronotum are small, a little longer than high, with the anterior margin moderately oblique, the posterior sub-perpendicular and the lower nearly straight and horizontal. The lobes of the mesosternum are separated by a space much broader than long, and the metasternal lobes by a space about square (female) or longer than broad (male). The tegmina and

wings are well developed. The former has the mediastine vein very short in the male, with the scapular area expanded so as to make the anterior margin of the tegmina plainly arcuate near the middle. The discoidal and ulnar areas are imperfectly or not at all closed. The posterior femora are slender, with more or less distinct bands on the upper face. The posterior tibiae have the apical spines on the inner side much stronger than those on the outside. The valves of the ovipositor are strongly exerted, the lower ones being furnished with an unusually strong lateral tooth.

Of the new genera given by Brunner in his *Révision du système des Orthoptères*, this is one of the few that can be clearly determined. He says in a foot-note that it is represented by four species in the United States; with *Stenobothrus occipitalis*, Thos., as the type. In other cases he simply states that the genus is founded upon one or more species from a certain locality without either naming or describing the species and with no description of the genus other than the very brief one given in the key. It is impossible to determine from these brief characterizations just what the genus is and to guess at these would only make confusion in synonymy so that I have determined to treat such genera as though they never had been made. I know of but three species in the United States or North America that will be included in this genus as I have limited it.

*Alpha*, Brunner, 1893. Rev. Sys. Orth., 121.

In part, *Stenobothrus*, Thos. Syn. Acrid., N. Am., 81.

*Ochrilidea*? Bruner, 1889. Proc. U. S. Nat. Mus., XII, 52.

#### KEY TO ALPHA, Bruner.

- A.<sup>1</sup> Median carina of the pronotum cut much behind the middle.  
Lateral carinae twice as widely separated at the posterior margin of the metazone as near the middle of the disk.
- B.<sup>1</sup> Posterior tibiae red ..... 1.— *Occipitalis*, Thos.
- B.<sup>2</sup> Posterior tibiae testaceous ..... 2.— *Cinerea*, Bruner.
- A.<sup>2</sup> Median carina of the pronotum cut very little behind the middle.  
Lateral carinae about twice as widely separated at the posterior margin of the metazone as at the middle of the disk. ....  
..... 3.— *Crenulata*, Bruner.

#### 1. ALPHA OCCIPITALIS, Thos. Figs. 18a, 18b.

*Stenobothrus occipitalis*, Thos., 1873. Syn. Acrid. N. Am., 81.

*Stenobothrus occipitalis*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.

*Stenobothrus occipitalis*, Bruner, 1884. Bul. 4 Div. Ent., 58.  
*Oxycoryphus occipitalis*, Thos., 1876. Proc. Dav. Acad. Nat. Sci.,  
 I, 251.

*Orchirilidea occipitalis*, Bruner, 1889. Pro. U. S. Nat. Mus., XII, 52.  
*Orchirilidea occipitalis*, Townsend, 1893. Insect Life, VI, 31.  
*Orchirilidea occidentalis*, Bruner, 1893. XII, Proc. U. S. Nat.  
 Mus., 51.

*Stenobothrus occidentalis*, Bruner, 1893. XII, Proc. U. S. Nat.  
 Mus., 51.

**Hab.** Both slopes of the Rocky Mountains, extending from New Mexico and Arizona to Idaho and Montana and as far east as western Nebraska and Dakota. According to Bruner this and the following species are "frequenters of the mountain slopes and foot-hills and especially so when these localities are somewhat sandy. Like *crenulata* they are partial to the bare surfaces, and are very active in their movements." The National Museum contains what appears to be Thomas' type as well as other specimens from Colorado, Wyoming, Montana, and Nebraska.

2. ALPHA CINEREA, Bruner.

*Orchirilidea cinerea*, Bruner. Proc. U. S. Nat. Mus., XII, 51.

**Hab.** Wyoming, Idaho, Western Dakota, and Nebraska.

3. ALPHA CRENULATA, Bruner.

*Orchirilidea crenulata*, Bruner. Proc. U. S. Nat. Mus., XII, 51.

**Hab.** Both slopes of the Rocky Mountains, from the southern to the northern boundaries of the United States, as far east as western Dakota and Nebraska.

XIX. **PHLIBOSTROMA**, Scud. Fig. 19.

Body robust, with the head unusually large. The occiput is strongly convex. The vertex convex, declivent, and not sulcate, advanced in front of the eyes only half as far as the distance between them, with distinct lateral carinæ which are nearly straight and meet in a rounded angle. There is sometimes a trace of a median carina. The lateral foveolæ are scarcely separated from the front by a carina which is always weak, sometimes wanting. The frontal costa is nearly plain or sulcate with heavy lateral carinæ which are very moderately divergent downward. The face is gently arcuate and very moderately oblique. The antennæ are filiform, longer (female) or considerably longer (male)

than the head and pronotum. The pronotum has the disk nearly plain, with all the carinæ, but especially the median, distinct. This is cut by the transverse sulcus very little behind the middle. The lateral carinæ are very strongly sinuate and upon the metazone divergent. They are cut plainly by the principal sulcus. The metazone has its posterior margin roundly angulate. The lateral lobes of the pronotum are higher than long with the anterior margin slightly oblique, the posterior perpendicular and the lower arcuate. The anterior corner of the lateral lobes is evenly rounded, the posterior angulate with a rounded apex. There is on the anterior part of the lateral lobes a heavy carina which extends from the middle sulcus forward and a little downward to near the middle of the anterior margin. The mesosternal lobes are separated by a narrow space several times as broad as long, and the metasternal lobes by a narrow space not more than twice (male) or three or four times (female) as long as broad. The tegmina are a little shorter (female) or a little longer (male) than the abdomen. They have the scapular area much expanded in the male so as to make the anterior margin strongly arcuate. The discoidal and ulnar areas are frequently imperfectly closed, and the former has an irregular intercalary vein. The posterior femora are banded above and on the outer face. The posterior tibiæ are reddish with the apical spurs on the inner side not very unequal in length. The valves of the ovipositor are very moderately exerted.

*Phlibostroma*, Scud., 1875. Cent. Orth., 28.

In part, *Stenobothrus*, Thos., 1873. Syn. N. Am. Acrid., 93.

*Beta*, Brunner, 1893. Rev. Sys. Orth., 121.

The genus is represented by a single variable species.

1. *PHLIBOSTROMA QUADRIMACULATA*, Thos. Figs. 19a, 19b.

*Stenobothrus quadrimaculatus*, Thos., 1871. Prelim. Rept. U. S. Geol. Surv. Wyo., 280.

*Stenobothrus quadrimaculatus*, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 430.

*Stenobothrus quadrimaculatus*, Thos., 1873. Syn. N. Am. Acrid., 93.

*Stenobothrus quadrimaculatus*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 56.

*Stenobothrus quadrimaculatus*, Bruner, 1885. Rept. Com. Agr., 1885, 307.

*Phlibostroma quadrimaculata*, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, No. 4, 135.

- Phlibostroma picta*, Scud., 1875. Cent. Orth., 29.  
*Phlibostroma picta*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 57.  
*Phlibostroma picta*, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., No. 7, 199.  
*Phlibostroma parva*, Scud., 1876. U. S. Geol. Surv. W. 100 Mer., App. JJ, 510.  
*Phlibostroma parva*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 57.  
*Phlibostroma parva*, Bruner, 1885. Rept. Com. Agr., 307.  
*Phlibostroma parva*, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., No. 7, 199.  
*Stenobothrus laetus*, Uhler, 1877. Bul. U. S. Geol. and Geog. Surv. Terr., III, 792.  
 Not *Phlibostroma parva*, McNeill. Psyche, VI, 64.

**Hab.** The eastern slopes of the Rocky Mountains from Texas to British America and eastward to Kansas and Nebraska.

The study of a considerable number of specimens from numerous localities and an examination of Scudder's type of *Phli. pictum* and of what appears to be Thomas' types of *St. quadrimaculatus* in the National Museum has led me to the conclusion that there is but a single variable species of this genus in the United States. The United States National Museum contains specimens from Colorado, Nebraska, Wyoming, British America, and Texas.

## XX. BOÖPEDON, Thos. Fig. 20.

Vertex declivent, convex and not separated from the front by distinct carinæ and not forming an angle with the front, but united with it in a curve. The foveolæ of the vertex and of the tempora are indicated by punctures or sometimes by very shallow sulcations. The latter are dorsal. The front is nearly perpendicular. The frontal costa is very broad, about equal to half the width of the vertex between the eyes, convex with the sides very little parallel, only a little constricted at the vertex, vanishing before reaching the clypeus. The antennæ are filiform, much (male) or somewhat (female) longer than the head and pronotum. The disk of the pronotum is more or less elevated toward the median carina. This is unusually prominent and is cut near the middle by the principal sulcus only. The lateral carinæ are nearly parallel or very moderately sinuate and on the metazone divergent. They are most distinct on the anterior margin of the prozone, obsolete on the metazone. The posterior margin of the

metazone is obtusely but sharply angulate. The lateral lobes of the pronotum are higher than long with the anterior and posterior margins straight, decidedly and equally oblique, and with the lower margin strongly arcuate and somewhat angulate in the middle. The lobes of the mesosternum are separated by a space much wider than long, the metasternal lobes by a linear ridge with an elongate deep pit on either side. The wings and tegmina are well developed but do not exceed the abdomen. The former in the male have the scapular area considerably expanded and filled with strong oblique cross-veins. The discoidal area is filled with irregularly reticulating veins. The posterior femora are banded on the inner and outer surfaces. The posterior tibiae have the apical spurs on the inner side very long and stout, being twice as long as those on the outer side, and the anterior one of the inner spurs is nearly twice as long as the other. The valves of the ovipositor are only moderately exerted.

This genus is North American and is represented by two species only, both western forms.

*Boöpedon*, Thos., 1870. Proc. Acad. Nat. Sci. Phila., 83.

*Boöpedon*, Thos., 1871. Prelim. Rept. U. S. Geol. Surv. Wyo., 272.

*Boöpedon*, Thos., 1873. Syn. Acrid. N. Am., 140.

*Boöpedon*, Brunner, 1893. Rev. Sys. Orth., 123.

#### KEY TO BOÖPEDON, THOS.

- A.<sup>1</sup> Elytra brown, plain or most obscurely spotted. General color varying from shining black to yellow, posterior femora stout and more than commonly expanded at the base with black bands extending across the outer, upper and inner faces. . . . . 1.—*Nubilum*, Say.
- A.<sup>2</sup> Elytra brown with a yellow stripe near both the anterior and posterior edges and three oblong yellow spots in the discoidal field. General color greenish-yellow varied with brown. Posterior femora slender with a longitudinal fuscous stripe on the outer, and fuscous bands or markings on the inner but not on the upper face . . . . . 2.—*Flavofasciatum*, Thos.

#### 1. BOÖPEDON NUBILUM, Say. Figs. 20a, 20b.

*Gryllus nubilus*, Say, 1825. Jour. Acad. Nat. Sci. Phila., IV, 308.

*Gryllus nubilus*, Say, 1825. Ent. N. Am. Ed. Lec., II, 237.

*Boöpedon nubilum*, Thos., 1871. Prelim. Rept. U. S. Geol. Surv. Wyo., 265 and 272.

*Boöpedon nubilum*, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 430.

*Boöpedon nubilum*, Thos., 1873. Syn. Acrid. N. Am., 141, pl. fig. 11.

*Boöpedon nubilum*, Bruner, 1877. Can. Ent., IX, 144.

*Boöpedon nubilum*, Bruner, 1885. Rept. Com. Agr., 303.

*Boöpedon nubilum*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 58.

*Boöpedon nubilum*, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, No. 4, 135.

*Boöpedon nubilum*, Bruner, 1885. Bul. Wash. Col. Lab. Nat. Hist., I, No. 7, 198.

*Boöpedon nigrum*, Thos., 1870. Proc. Acad. Nat. Sci. Phila., 83.

**Hab.** Eastern slopes of the Rocky Mountains, extending to eastern Nebraska, Kansas, and Texas.

The National Museum contains Thomas' type of *B. nigrum*.

## 2. *BOÖPEDON FLAVOFASCIATUM*, Thos.

*Boöpedon flavofasciatum*, Thos., 1870. Proc. Acad. Nat. Sci. Phila., 84.

*Boöpedon flavofasciatum*, Thos., 1871. Prelim. Rept. U. S. Geol. Surv. Wyo., 265 and 273.

*Boöpedon flavofasciatum*, Thos., 1873. Prelim. Rept. U. S. Geol. Surv. Mont., 430.

*Boöpedon flavofasciatum*, Thos., 1873. Syn. Acrid. N. Am., 141.

*Boöpedon flavofasciatum*, Bruner, 1877. Can. Ent., IX, 144.

*Boöpedon flavofasciatum*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 58.

**Hab.** Montana, Wyoming, Colorado, Nebraska, New Mexico, Texas, and eastern slopes of the Rocky Mountains.

The National Museum contains Thomas' types, two females. It also contains a male from Dallas, Texas, which also probably belongs to this species. In this specimen the tegmina are less than half as long as the abdomen and rounded at the tip. The femora are decidedly longer than in *B. nubilum*, and the lateral carinæ of the pronotum are more distinct and the disk is less rounded.

## XXI. *PLECTROPHORUS*, n. gen. Fig. 21.

Head much shorter than the pronotum. Vertex horizontal, sulcate, with slight lateral and obsolete median carina, but little advanced in front of the eyes. (The frontal costa is indistinctly separated from the vertex and it is unusually prominent, seen from above, and

much advanced.) The top of the head is furnished with three slight carinæ. The lateral foveolæ are scarcely discernible as a group of punctations, but the tempora are plainly visible from above. The frontal costa is prominent, not at all sulcate but plainly convex, broad, with the sides sub-parallel. The face seen from the side is strongly arcuate and moderately declivent. The antennæ are sub-filiform, as long as the head and pronotum. The pronotum has the disk slightly elevated toward the median carina, which is very distinct and is cut once plainly in front of the middle. The lateral carinæ are distinct, except between the first and third sulci where they are broken and interrupted. They are gently arcuate and convergent to the second sulcus, beyond which they are slightly arcuate and strongly divergent. The metazone is strongly angulate. The lateral lobes of the pronotum are much higher than long, with the anterior and posterior margins straight and very little inclined and the lower margin horizontal behind, ascending before the middle. The mesosternal lobes are separated by a space about as long as broad. The metasternal lobes are nearly (female) or quite (male) contiguous behind and inclose two deep pits. The tegmina and wings are very large. The former has the discoidal area densely and irregularly reticulate. The posterior femora are unusually heavy at the base, with the apical half slender. The posterior tibiæ have the apical spurs on the inner side very large, the anterior one being straight, twice as long as the one behind it and scarcely shorter than the first tarsal joint. The valves of the ovipositor are moderately exerted. The disk of the pronotum is velvety black with a broad median longitudinal light stripe, and the tegmina are distinctly maculate with large spots, as in *Hippiscus*.

The genus is tropical American. It includes two species. The type is *Stenobothrus viatorius*, Sauss. This species, with *Scyllina peragrans*, Stål, from South America was made by Stål the type of the genus *Scyllina*. But it is generically distinct from *S. peragrans*, and does not fall into *Scyllina* as it is given in his key. I have therefore separated it.

In part, *Scyllina*, Stål, 1873. Recen. Orth, I, 94.

#### KEY TO PLECTROPHORUS, n. gen.

- A.<sup>1</sup> Foveolæ of the vertex semi-elliptical. Posterior femora orange, with the apex blue..... 1.—*Viatorius*, Sauss.
- A.<sup>2</sup> Foveolæ of the vertex triangular. Posterior femora red, with the apex blue..... 2.—*Gregarius*, Sauss.

1. PLECTROPHORUS VIATORII, Sauss. Figs. 21a, 21b, 21c.

*Stenobothrus viatorius*, Sauss., 1861. Orth. Nov. Am., II, 20.

*Stenobothrus viatorius*, Thos., 1873. Syn. Acrid. N. Am., 206.

*Scyllina viatoria*, Stål, 1873. Recen. Orth., I, 112.

**Hab.** All of Mexico, where it is common and injurious (Sauss.).  
I have specimens from Orizaba and Tlalpam.

2. PLECTROPHORUS GREGARIUS, Sauss.

*Stenobothrus gregarius*, Sauss., 1861. Orth. Nov. Am., II, 20.

*Stenobothrus gregarius*, Thos., 1873. Syn. Acrid. N. Am., 206.

**Hab.** Islands of St. Thomas and Hayti (Sauss.).

I am unacquainted with the species, but it probably belongs to this genus.

XXII. MECOSTETHUS, Fieb. Fig. 22.

Vertex horizontally produced with a median carina more or less distinct and with lateral carinæ distinct, straight, meeting in a sharp or rounded point in front to form an angle a little greater or a little less than 90 degrees. The lateral foveolæ are very small, triangular, basal (distant from the vertex) visible from above, sometimes almost obsolete. The frontal costa is continued distinctly almost to the clypeus, it is sulcate at least below the ocellus. The antennæ are filiform, much longer (male) or about as long (female) as the head and pronotum together. The pronotum is plain above with all the carinæ distinct, the median cut in or a little in advance of the middle, the lateral cut by the principal sulcus only or by either or both of the other sulci as well. The metazone is very obtusely angled. The lateral lobes of the pronotum are at least as high as long with the anterior and posterior margins sub-perpendicular, and with the lower margins only moderately obtuse and but little rounded at the apex. The tegmina are well developed in both sexes, the mediastine vein is well developed, extending beyond the middle and the costal field is expanded at the base and furnished with an adventitious vein. The scapular area is but little expanded in the male and is about equal in both sexes. The discoidal area is furnished with a very prominent intercalary vein which is nearer the ulnar than the radial vein. This area is occupied by a double series of strong cross-veins and forms the musical organ in the male. The posterior femora are somewhat longer than usual, extending beyond the end of the abdomen in the male. The last

ventral plate of the male is acutely produced, being at least twice as long as its greatest depth. The valves of the ovipositor are strongly exerted, with the upper pair finely crenulate above.

*Mecostethus*, Fieber, 1853. Syn., 10.

*Mecostethus*, Bruner, 1882. Pro. Eur. Orth., 94, fig. 24.

*Mecostethus*, Bruner, 1893. Rev. Sys. Orth., 123.

*Mecostethus*, Morse, 1896. Psyche, VII, 327, figs. 13-15b.

*Stetheophyma*, Fisch., 1853. Orth. Eur., 357, XVIII, fig. 3.

*Stetheophyma*, Stål, 1873. Recen. Orth., I, 93.

*Stetheophyma*, Thos., 1873. Syn. Acrid. N. Am., 98.

*Stetheophyma*, Boliv., 1876. Syn. Acrid. Esp., 139.

*Stetheophyma*, Thos., 1880. Nox. and Ben. Ins. Ill., IX, 84.

This European genus is represented in North America by three species.

#### KEY TO MECOSTETHUS, Fieb.

- A.<sup>1</sup> Prozone shorter than the metazone. Lateral carinae plainly sinuate and strongly divergent from the first sulcus to the posterior margin. Posterior femora slender.
- B.<sup>1</sup> Scapular area of the tegmina with a pale streak. Intercalary vein of the male with very obscure low dull teeth. . 1.—*Lineatus*, Scud.
- B.<sup>2</sup> Scapular area without a pale streak. Intercalary vein of the male with sharp, elevated, minute, closely-set teeth. . 2 — *Gracilis*, Scud.
- A.<sup>2</sup> Prozone as long as the metazone. Lateral carinae very nearly straight and very gently divergent. Posterior femora not unusually slender. . . . . 3.—*Platyptera*, Scud.

#### 1. MECOSTETHUS LINEATUS, Scud. Figs. 22a, 22b.

*Arcyptera lineata*, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 462.

*Arcyptera lineata*, Scud., 1874. Fin. Rept. Geol. Surv. N. H., I, 373.

*Arcyptera lineata*, Provancher, 1877. Faune Ent. du Can., 44.

*Arcyptera lineata*, McNeill, 1891. Psyche, VI, 66.

*Stetheophyma lineata*, Thos., 1873. Syn. Acrid. N. Am., 98.

*Stetheophyma lineata*, Thos., 1880. Nox. and Ben. Ins. Ill., 105.

*Stetheophyma lineata*, Fernald, 1887. Orth. N. E., 38.

*Stetheophyma lineata*, Bruner. 3rd Rept. U. S. Ent. Com., 56.

*Stetheophyma lineata*, Morse, 1894. Psyche, VII, 105.

*Mecostethus lineatus*, Morse, 1896. Psyche, VII, 327, figs. 13, 13b.

? *Mecostethus variegatus*, Walk., 1870. Cat. Derm. Salt., IV, 781.

? *Mecostethus variegatus*, Thos., 1873. Syn. Acrid. N. Am., 210.

**Hab.** New England to Northern Illinois and Iowa.

This is a rare species which has been reported but a few times. Walker refers certain specimens from North America to *S. variegatus*, Sulz. It is possible that this determination was correct, but it is very improbable, and I have referred his name to this species with great doubt. It is possible that his specimen is *Boöpedon nigrum*, Thos.

2. MECOSTETHUS GRACILIS, Scud.

*Arcyptera gracilis*, Scud., 1862. Can. Nat., VII, 286.

*Arcyptera gracilis*, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 463.

*Arcyptera gracilis*, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 148.

*Arcyptera gracilis*, Scud., 1874. Fin. Rept. Geol. Surv. N. H., I, 373.

*Arcyptera gracilis*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 56.

*Arcyptera gracilis*, Scud., 1893. 23rd Ann. Rept. Ent. Soc. Ont., 76, fig. 53.

*Arcyptera gracilis*, Morse, 1894. Psyche, VII, 105.

*Mecostethus gracilis*, Morse, 1896. Psyche, VII, 327, fig. 14.

**Hab.** Maine, Red River (British America), Nebraska, and Black Hills (Dakota). The National Museum contains specimens from the last mentioned locality collected by Mr. Bruner.

3. MECOSTETHUS PLATYPTERUS, Scud.

*Arcyptera platyptera*, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 463.

*Stenobothrus platyptera*, Bruner, 1883. 3rd Rept. Ent. Com., 56.

*Stenobothrus platyptera*, Morse, 1894. Psyche, VII, 105.

*Mecostethus platyptera*, Morse, 1896. Psyche, VII, 327, figs. 15, 15b.

**Hab.** New England.

This species has never been reported outside of New England.

XXIII. BOÖTETTIX, Bruner. Fig. 23.

Scutellum of the vertex nearly horizontal, very shallowly sulcate, with a delicate median carina, and slight though distinct raised walls which meet at an acute angle in a very sharp point at the vertex. The tempora are triangular, nearly vertical, and scarcely visible from above, with the lower wall obsolete. The frontal costa is contracted for a short distance below the vertex into a very narrow ridge scarcely wider than the median carina of the pronotum. This rapidly expands until

when opposite the antennæ it is as wide as at any point; from this point it is sub-parallel and sulcate with raised walls. The antennæ are shorter than (female) or about equal to (male) the head and pronotum. They are coarse, somewhat flattened, especially on the apical portion where they are somewhat clavate and more (male) or less (female) acuminate. The eye is rather long, not especially prominent. The occiput is much (male) or little (female) elevated. The pronotum has the disk of the prozone strongly convex, that of the metazone more nearly flat, with its sides rapidly divergent and the posterior margin strongly rounded. The median carina is quite distinct on the metazone, very faint on the prozone except in front of the anterior sulcus. It is cut by all three sulci. The lateral carinæ are entirely obsolete. The lateral lobes of the pronotum are about as long as high, with the anterior and posterior margins sub-perpendicular and both lower angles strongly rounded. The prosternum is furnished with a very low, rounded process. The lobes of the mesosternum and the metasternum are transverse in the female, square in the male. The tegmina are furnished with a distinct (female) or irregular and incomplete (male) intercalary vein, and the plicate is soon united with the dividing vein. The mediastine vein exceeds half the length of the wing in the female, in the male it is much abbreviated and the scapular area is much expanded, hyaline, and filled with a series of strong curved veins. The valves of the ovipositor of the female are exerted, the lower furnished with a large blunt tooth. The posterior femora are slender, equaling (female) or surpassing (male) the abdomen in length.

*Boötettix*, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 58.

This genus contains but one known species.

*BOÖTETTIX ARGENTATUS*, Bruner. Figs. 23a, 23b.

*Boötettix argentatus*, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 59, pl. i, fig. 4 (female), 5 (male).

*Boötettix argentatus*, Townsend, 1892. Can. Ent., XXIV, 198.

*Boötettix argentatus*, Townsend, 1893. Ins. Life, VI, 30.

*Boötettix argentatus*, Scudder, 1893. 23rd Ann. Rept. Ent. Soc. Ont., 76.

This is an arboreal species, said by Mr. Bruner to be found only on an evergreen species of *Ceanothus*. Since reported by Mr. Townsend to be found on *Larrea mexicana*. The latter is an evergreen, and as no evergreen *Ceanothus* is given by either Gray or Coulter it is probable that this species is confined to the single food-plant last mentioned.

XXIV. **LIGUROTETTIX**, n. gen. Fig. 24.

Scutellum of the vertex considerably declined, narrower than the short diameter of the eye, elliptical and sulcate throughout, with the boundary walls high raised lines which are continued backward to a point opposite the middle of the eyes. The lateral foveolæ are visible from above, deeply impressed, and trapezoidal in shape. The frontal costa is not sulcate even at the ocellus. The antennæ are short, fili-form, and slender. The eyes are prominent, and the occiput is much (male) or somewhat (female) higher than the disk of the pronotum. The disk of the pronotum is moderately rounded, more decidedly on the prozone. The median carina is slight but distinct, cut near the middle by the last transverse sulcus. The lateral carinæ are wanting, even on the metazone. The lateral lobes of the pronotum are a little higher than long, with the anterior and posterior borders both sub-perpendicular, and both of the lower angles obtuse and rounded. The prosternum is furnished with a large pyramidal spine. The mesosternal lobes are wider than long in the female; about equally as wide as long in the male. The metasternal lobes are separated by a narrow space in the female, united behind in the male. The tegmina exceed the abdomen in length, the intercalary vein is distinct, and the plicate is soon united with the dividing vein. The mediastine vein is well developed in the female, and extends to a point beyond the middle of the wing. In this sex also the scapular area is filled with a single series of oblique cross-veins, but is not hyaline. In the male the mediastine vein is very much abbreviated and the scapular area greatly expanded so that it occupies one-third of the width of the tegmina and causes the anterior margin of the wing to be much expanded in the second and third fourths. It is hyaline and filled with a series of strong, curved, oblique veins forming a very efficient musical organ. Behind this musical organ the anterior radial vein is greatly thickened. In both sexes the longitudinal veins are distinct, and the cross veins are few and weak comparatively. The wings are more than twice as long as wide, hyaline, with a slight infuscation at the tip, and the veins black. The hind femora are moderately slender with distinct fuscous bands on the upper surface. The valves of the ovipositor of the female are moderately exerted, and the lower pair are furnished with a strong lateral tooth.

This genus is a curious composite form with affinities with *Ædipodina* and *Acridina*, as well as *Truxalina*. It is not closely related to

any other genus of this sub-family with which I am acquainted, but it is nearest *Boötettix*.

LIGUROTETTIX COQUILLETII, n. sp. Figs. 24a, 24b, 24c.

Length (male).....	14-16 mm.	(female).....	18 mm.
Tegmina.....	14-16 mm.	.....	17 mm.
Antennæ.....	5 mm.	.....	5 mm.
Post. Fem.....	8- 9 mm.	.....	9.5 mm.

The scutellum of the vertex is somewhat elliptical in shape, with the posterior end open and the anterior margin somewhat encroached upon in some specimens, especially in the female by the lateral foveolæ. These are about as wide as long with the narrow end forward, the two being separated at the apex by the width of the frontal costa, which is at this point only a little more than half its width between the antennæ where it is very slightly expanded. The antennæ are scarcely equal to the head and pronotum in length. The pronotum has all of the sulci about equally distinct, and the posterior margin of the disk is much rounded rather than angulate. The whole surface of the pronotum, but more especially the metazone, is finely tuberculate. The wings are more than twice as long as wide. The posterior femora do not surpass the abdomen.

In color there seems to be a constant difference between the males and the females, the former being very obscurely maculate so that the appearance is nearly uniform dull brown, with the tegmina rather faintly flecked with somewhat evenly distributed small spots of fuscous and the posterior femora plainly banded upon the upper surface. The female has the head and face, disk of the pronotum, and the posterior femora with the body-color light yellow or reddish brown, maculate everywhere, except on the posterior femora, more or less distinctly with numerous thickly scattered small brown or fuscous spots. The lateral lobes of the pronotum are, in the light colored females, generally much darkened upon the prozone. The tegmina are distinctly spotted with thickly scattered and evenly distributed quadrate fuscous spots. The posterior tibiæ are dull yellow.

Described from three males and two females which were collected by Mr. Coquillett (in whose honor the species is named), in Los Angeles county, California. These specimens now belong to the United States National Museum.

This species is of peculiar interest in possessing the most highly developed musical organ known in the family *Acrididæ*. According

to Mr. Coquillett its stridulation is as loud and sustained as that of some of the *Cicada*.

XXV. **STENOBOTHRUS**, Fisch. Fig. 25.

“Vertex triangular, obtuse,\* with the foveolæ, which are visible from above, narrow, oblong, rhomboidal. Antennæ filiform. Frontal costa convex. Pronotum with the disk almost plain, the median carina distinct and cut by the principal sulcus only, and the lateral carinæ straight or more or less arcuate or sinuate. The lateral lobes are higher than long,† with the lower angles somewhat obtuse. Tegmina fully developed, rarely abortive, with the mediastine area more or less extended, either narrow throughout or widened at the base, and sometimes including an adventitious vein. The scapular area is filled with oblique transverse veins and in the male is dilated. The radial vein is composed of three principal branches; there is no intercalary vein. The ulnar vein is composed of two branches which sometimes unite again before the middle, the dividing vein is straight, and the plicate vein is free or united with the dividing. The wings are fully developed or rarely abortive, not fenestrated, rarely wanting. The posterior femora are frequently mottled, very rarely distinctly spotted. The posterior tibiæ are frequently dull testaceous, rarely red. The sternum is rather broad, with the mesosternal lobes widely separated and the metasternal lobes distant. The first abdominal segment is furnished with a closed tympanum. The anal segment is longitudinally sulcate with the supra-anal plate of the male obtusely triangular. The subgenital plate of the male is recurved with the apex obtuse or acuminate. The valves of the ovipositor are short but exerted, and sometimes furnished with a lateral basal tooth.”

*Stenobothrus*, Fisch., 1843. Orth. Europ., 313.

*Stenobothrus*, Bruner, 1882. Pro. Europ. Orth., 100.

*Stenobothrus*, Bruner, 1893. Rev. Sys. Orth., 122.

*Stenobothrus*, Morse, 1896. Psyche, VII, 327, fig. 12.

In part, *Gomphocerus*, Stål, 1873. Recen. Orth., 193.

*Gomphocerus*, Bolivar, 1876. Orth. de Esp., 107.

*Chorthippus*, Fieb.

This large European genus is very meagerly represented in this country by only four species, though formerly it served the same use-

\* In *St. curtipennis*, Harr., the vertex of the male is acute.

† In *St. curtipennis*, Harr., the lateral lobes of the pronotum are about equally high and long.

ful purpose in *Truxalinæ* that *Ædipoda* did in *Ædipodinæ*, and was employed as a convenient appellation for species that did not fall in any other genus.

KEY TO STENOBOTHRUS, Fisch.

- A.<sup>1</sup> Tegmina unspotted. Posterior tibiæ never red.
- B.<sup>1</sup> Median carina of the vertex obsolete. Lateral carinæ of the pronotum divergent from the first sulcus. Posterior margin of the metazone angulate. Disk much broader at the posterior than at the anterior margin. . . . . 1.—*Curtipennis*, Harr.
- B.<sup>2</sup> Median carina of the vertex slight but distinct. Lateral carinæ of the pronotum divergent from the second sulcus. Posterior margin of the metazone rounded. Disk not much broader at the posterior than at the anterior margin. . . . 2.—*Coloradensis*, n. sp.
- A.<sup>2</sup> Tegmina spotted more or less distinctly. Posterior tibiæ red.
- B.<sup>1</sup> Lateral lobes of the pronotum not much narrower at the lower margin than at the lateral carinæ. Median carina of the pronotum cut a little in front of the middle. Tegmina about as long as (female) or longer than (male) the abdomen, distinctly spotted. . . . . 3.—*Brunneus*, Thos.
- B.<sup>2</sup> Lateral lobes of the pronotum much narrower at the lower margin than at the lateral carinæ. Median carina of the pronotum cut a little behind the middle. Tegmina about half (male) or less than half (female) the length of the abdomen. . 4.—*Sordidus*, n. sp.

I. STENOBOTHRUS CURTIPENNIS, Harr.

- Locusta curtipennis*, Harr., 1835. Cat. Ins. Mass., 56.
- Locusta (Chloëaltis) curtipennis*, Harr., 1862. Treat. Ins. Inj. Veg., 184, pl. iii, fig. 1.
- Locusta (Chloëaltis) curtipennis*, Rathvon, 1862. Rept. Com. Agr., 368, fig. 28.
- Stenobothrus curtipennis*, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 456.
- Stenobothrus curtipennis*, Scud., 1862. Can. Nat., VII, 286.
- Stenobothrus curtipennis*, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 148.
- Stenobothrus curtipennis*, Walk., 1870. Cat. Derm. Salt., IV, 754.
- Stenobothrus curtipennis*, S. I. Smith, 1872. Rept. Sec. Agr. Conn., 376.
- In part, *Stenobothrus curtipennis*, Thos., 1873. Syn. Acrid. N. Am., 91.

- Stenobothrus curtispennis*, Scud., 1874. Fin. Rept. Geol. Surv. N. H., I, 373, fig. 37.
- Stenobothrus curtispennis*, Thos., 1876. Bul. I, Ill. State Lab. Nat. Hist., 61.
- Stenobothrus curtispennis*, Provancher, 1877. Faune Ent. du Can., 43.
- Stenobothrus curtispennis*, Lintner, 1885. 2nd Rept. Ins. N. Y., 196.
- Stenobothrus curtispennis*, Fernald, 1887. Orth. N. E., 37.
- Stenobothrus curtispennis*, Davis, 1889. Am. Ent., V, 81.
- Stenobothrus curtispennis*, McNeill, 1891. Psyche, VI, 65.
- Stenobothrus curtispennis*, J. B. Smith, 1892. Bul. 90, N. J. Agr. Exp. Sta., 31.
- Stenobothrus curtispennis*, Osborn, 1892. Proc. Iowa Acad. Sci. 1890-1891, 4.
- Stenobothrus curtispennis*, Scud., 1893. 23rd Ann. Rept. Ent. Soc. Ont., 76, fig. 52.
- Stenobothrus curtispennis*, Morse, 1894. Psyche, VII, 14 and 104.
- Stenobothrus curtispennis*, Blatchley, 1894. Can. Ent., XXVI, 222.
- Stenobothrus curtispennis*, Blatchley, 1896. Can. Ent., VII, 327, fig. 12.
- Stenobothrus longispennis*, Scud., 1862. Jour. Bost. Soc. Nat. Hist., VII, 456.
- Stenobothrus longispennis*, S. I. Smith, 1868. Proc. Port. Soc. Nat. Hist., I, 148.
- Stenobothrus longispennis*, Walk., 1870. Cat. Derm. Salt., 754.
- Stenobothrus longispennis*, Thos., 1873. Syn. Acrid. N. Am., 91.
- Stenobothrus longispennis*, Thos., 1875. Rept. Geol. and Geog. Surv. W. 100 Mer., V, Zool., 872.
- Stenobothrus longispennis*, Thos., 1876. Bul. I, Ill. State Lab. Nat. Hist., 61.
- Stenobothrus longispennis*, Provancher, 1877. Faune Ent. du Can., 43.
- Stenobothrus longispennis*, Morse, 1894. Psyche, VII, 14 and 104.
- Not *Stenobothrus curtispennis*, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 430.
- Not *Stenobothrus curtispennis*, Bruner, 1877. Can. Ent., IX, 144.
- Not *Stenobothrus longispennis*, Scud., 1880. 2nd Rept. U. S. Ent. Com., App. II, 25.
- Not *Stenobothrus curtispennis*, Bruner, 1885. Rept. Com. Agr., 307.
- Hab.** The North Atlantic and North Central States and Canada west to the Red River. The references to this species from the Northwest are, I think, mistaken, and should be made to the closely allied

species, *S. coloradensis*, n. sp. Mr. Bruner's thorough report on the Kansas *Orthoptera* does not give *S. curtipennis* as occurring in that State, so that Iowa seems to be the western limit of the eastern species and Nebraska (probably north-western) the eastern limit of the western species.

2. *STENOBOTHRUS COLORADENSIS*, n. sp. Figs. 25a, 25b.

*Stenobothrus curtipennis*, Thos., 1870. Prelim. Rept. U. S. Surv. Mont., 430.

*Stenobothrus curtipennis*, Bruner, 1877. Can. Ent., IX, 144.

*Stenobothrus curtipennis*, Scud., 1880. 2nd Rept. U. S. Ent. Com., App. II, 25.

*Stenobothrus curtipennis*, Bruner, 1885. Rept. Com. Agr., 307.

*Stenobothrus*, sp., Uhler, 1877. Bul. U. S. Geol. and Geog. Surv. Terr., III, 793.

Length (female).....	21	mm.
Tegmina.....	18	mm.
Antennæ.....	7	mm.
Femora.....	12.5	mm.

The vertex is narrow, about equal to the short diameter of the eye. The scutellum has a distinct arcuate sulcus divided by a very plain carina running close to its anterior margin. The walls of the scutellum consist of a distinct raised line which is curved rather than angulate. The lateral foveolæ are linear. The frontal costa is rounded, narrow, and punctate above the ocellus, with its sides sub-parallel; below it is shallowly sulcate with the sides somewhat rapidly divergent. The antennæ are filiform, flattened, and barely as long as the head and pronotum. The pronotum has the median carina very distinct, cut very slightly behind the middle by the principal sulcus. The first sulcus is about half-way between the anterior margin of the disk and the principal sulcus. The lateral carinæ are gently curved, being most nearly approximate about the first sulcus. The posterior margin is rather gently arcuate with the disk at that point very little wider than the anterior margin. The lateral lobes of the pronotum are a little higher than long. The tegmina are yellowish-brown, plain, and about half as long as the abdomen. The posterior femora and tibiæ are reddish-yellow and immaculate except for the black spots at the knee. The color is olivaceous brown deepening to a reddish brown on the abdomen, with the top of the head and the disk of the pronotum

lighter and a very much broken blackish stripe behind the eye. The surface is everywhere shining, but least so on the top of the head and pronotum.

Very closely related to *Stenobothrus curtispennis*, but sufficiently distinct to be easily recognized. When compared with that species, *coloradensis* has the vertex narrower between the eyes with the median carina distinct instead of very faint. The antennæ of the female are scarcely as long as the head and pronotum instead of being distinctly longer. The pronotum is much shorter proportionally and decidedly less expanded posteriorly, the disk being scarcely wider at the posterior margin than at the anterior margin instead of being  $1\frac{1}{2}$  times as wide. The lateral carinæ are gently instead of strongly curved, and the posterior margin of the disk is rounded instead of angulate. Finally, the posterior femora are more robust.

Described from a single female received from Prof. C. P. Gillette, Fort Collins, Colorado. The specimen was labeled "Colo. 1936."

**Hab.** The eastern slopes of the Rocky Mountains, south to Utah and Colorado, and west to the Sierra Nevada Mountains.

### 3. STENOOTHUS BRUNNEUS, Thos.

*Stenobothrus brunneus*, Thos., 1871. Prelim. Rept. U. S. Geol. Surv. Wyo., 266.

*Stenobothrus brunneus*, Thos., 1872. Prelim. Rept. U. S. Geol. Surv. Mont., 430.

*Stenobothrus brunneus*, Thos., 1873. Syn. Acrid. N. Am., 91.

*Stenobothrus brunneus*, Bruner, 1877. Can. Ent., IX, 144.

*Stenobothrus brunneus*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 56.

This is apparently a somewhat uncommon species since it has been reported in but two or three collections. It is found from Nebraska to the Sierra Nevada Mountains and south to Colorado. The National Museum contains specimens labeled *Gomphocerus brunneus* from Fort McLeod, Henry county, Idaho; Henry Lake, Idaho, and Fort McKinney, Wyoming.

### 4. STENOOTHUS SORDIDUS, n. sp. Fig. 25c.

Length (male).....	17 mm.	(female).....	24 mm.
Antennæ.....	10 mm.	.....	10 mm.
Tegmina.....	7 mm.	.....	5.5 mm.
Post. Fem.....	10 mm.	.....	12 mm.

Most nearly related to *S. brunneus*, but it is easily distinguished

from that species in the short tegmina and the very different pronotum which has the median carina cut a little behind instead of a little in front of the middle, and the lateral lobes not higher than wide and much narrower below than at the lateral carinæ. This species also lacks the longitudinal median stripe generally present on the head and pronotum and tegmina of *S. brunneus*, and there is scarcely a trace of a median carina on the vertex.

Described from numerous specimens in the United States National Museum which are labeled *Gomphocerus shastanus*, Scudd.

**Hab.** Salmon City, Idaho.

XXVI. **BRUNNERIA**, n. gen. Fig. 26.

Vertex broad, the distance between the eyes being equal to the width of one of the tegmina at the base, very nearly horizontal, convex, not at all sulcate, with the boundary walls in front straight raised lines which meet in an angle a little greater than 90 degrees (male). The lateral foveolæ are deeply impressed, plainly visible from above, rhomboidal, four or more times as long as wide, and with heavy walls which are approximate at the tip of the vertex. The frontal costa viewed from the side is generally arcuate and moderately oblique. It is plain throughout or very slightly hollowed below the ocellus with a single row of distinct punctures on either side. It is rather abruptly acuminate at the apex, suddenly and considerably expanded opposite the antennæ, decidedly contracted again at the ocellus, and below rather rapidly expanding. The antennæ are slightly depressed, filiform, and considerably longer than the head and pronotum combined. The pronotum has the disk very gently rounded from side to side, a little longer than the top of the head. The anterior margin of the disk is very slightly angulate, the posterior margin is straight or very slightly angulate. The median carina is a moderately heavy raised line, equally distinct throughout, cut once a little behind the middle by the principal sulcus. The lateral carinæ are slight, moderately sinuate, and cut by the principal sulcus only. The lateral lobes are about as high as long, with the anterior margin nearly perpendicular and the posterior margin considerably inclined and the posterior lower angle angulate. The tegmina are abortive and the posterior femora slender.

This genus is closely related to *Stenobothrus*, but is distinguishable in having the posterior margin of the pronotum straight, the lateral lobes not higher than broad, and the elytra abortive.

## I. BRUNNERIA SHASTANA, Scud. Figs. 26a, 26b.

This species is reported by Mr. Scudder as occurring on Mount Shasta among the firs. It has not been reported elsewhere. The United States National Museum contains a male and a female which seem to be typical specimens. I have examined a male from Mr. Scudder's collection.

*Gomphocerus shastanus*, Scud., 1880. 2nd Rept. U. S. Ent. Com., App. II, 25, pl. xvii; fig. 15 (male), 18 (female).

## XXVII. GOMPHOCERUS, Thunb. Fig. 27.

Similar to *Stenobothrus* except that the antennæ are furnished with a short depressed club at the apex, and (according to Brunner) the tympanum is partially open.

*Gomphocerus*, Thunb., 1815. Mem. Ac. Petersb., V, 221.

*Gomphocerus*, Serv., 1839. Hist. Nat., 745.

In part, *Gomphocerus*, Stål, 1873. Recen. Orth., 93.

In part, *Gomphocerus*, Bol., 1876. Syn. Orth. Esp., 100 and 107.

*Gomphocerus*, Brunner, 1882. Pro. Eur. Orth., 128.

*Gryllus*, *Acridium*, Brunner.

## KEY TO GOMPHOCERUS, Thunb.

- A.<sup>1</sup> Size small (male about 14 mm.), anterior tibiæ clavate with a distinct groove on the outer face. . . . . 1.—*Clavatus*, Thos.  
 A.<sup>2</sup> Size medium (male about 18 mm.), anterior tibiæ only very moderately and regularly expanded apically in the male. . . . .  
 . . . . . 2.—*Clepsydra*, Scud.

## I. GOMPHOCERUS CLAVATUS, Thos.

*Gomphocerus clavatus*, Thos., 1873. Syn. Acrid. N. Am., 96.

*Gomphocerus clavatus*, Bruner, 1877. Can. Ent., IX, 144.

*Gomphocerus clavatus*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 56.

*Gomphocerus carpenterii*, Thos., 1874. Bul. 2, U. S. Geol. and Geog. Surv. Terr.

*Gomphocerus carpenterii*, Thos., 1875. Rept. Geol. and Geog. Surv. W. 100 Mer., V, Zool., 871.

*Stenobothrus carpenterii*, Thos., 1876. Proc. Dav. Acad. Nat. Sci., I, 251.

I have united these species after much hesitation. The United States National Museum contains Thomas' types of both *clavatus* and

*carpenterii*, in each case a single male. These apparently differ only in that the tibiae of the latter are much more decidedly clavate. But this, as well as the gibbosity of the pronotum of the male and the size of the club of the antennae, is a variable character, as I have ascertained from the examination of many specimens.

**Hab.** The great plains east of the Rocky Mountains, from Dakota to New Mexico, and eastward to Western Kansas and Nebraska.

2. *GOMPHOCERUS CLEPSYDRA*, Scud. Figs. 27a, 27b.

*Gomphocerus clepsydra*, Scud., 1876. U. S. Geol. Surv. W. 100 Mer, App. II, 506.

*Gomphocerus clepsydra*, Bruner. 3rd Rept. U. S. Ent. Com., 56.

*Gomphocerus clepsydra*, Bruner. Rept. Com. Agr., 1885.

This species is, not improbably, a form of the preceding very variable species, but I have not sufficient material in this species to settle the point to my satisfaction. The United States National Museum contains one of Scudder's types (a male from New Mexico). In the same collection there is also a type of Scudder's *Gomphocerus antennaria*, which is identical with the species just described. I have not included *G. antennaria* in the synonymy of *G. clepsydra* as I do not know where it was described, if it has been described at all. My recollection is that Dr. Scudder has at some time informed me that no description of it was ever published.

**Hab.** The great plains east of the Rocky Mountains, from British America to Northern New Mexico, and as far east as Kansas and Nebraska. The species is said by Bruner to be common in the Yellowstone Valley.

XXVIII. **PNIGODES**, n. gen. Fig. 28.

Head disproportionately large for the pronotum, it as well as the rest of the body being decidedly wider than the latter at its posterior margin. It exceeds the pronotum in length by about the length of the vertex in front of the eye. The scutellum of the vertex is nearly horizontal, deeply excavate and bounded anteriorly with distinct straight walls which meet at an angle of 90 degrees (female) or less (male).

The frontal costa is regularly acuminate and sulcate above to the tip of the vertex, regularly divergent (male) or slightly and abruptly expanded below the ocellus (female). The lateral foveolae, plainly visible from above, are sub-rhomboidal, very slightly narrowed anteriorly.

They are twice as long as wide with a heavy boundary wall. The antennæ are filiform, little (female) or somewhat (male) exceeding the combined length of the head and pronotum.

The pronotum have the anterior and posterior margins of the disk slightly and about equally rounded. The median carina is a moderately high raised line equally distinct throughout and cut by the principal sulcus only, decidedly behind the middle. The lateral carinæ are very slight and are clearly outlined with white. They are cut by all three sulci. The lateral lobes have the posterior margin nearly vertical, the anterior moderately inclined, and the posterior lower angle broadly rounded. The valves of the ovipositor of the female are included.

The posterior femora are strong and marked above as in *Psolorssa* with three triangular dark-brown spots. The posterior tibiæ have the apical spur on the inner side about twice as long as the one beside it.

1. *PNIGODES MEGOCEPHALA*, n. sp. Figs. 28a, 28b.

Length (male).....15	mm.	(female).....19	mm.
Tegmina.....4.5-5.5	mm.	.....7	mm.
Antennæ.....6	mm.	.....6.5	mm.
Post. Fem.....9	mm.	.....10.5	mm.

Yellowish-brown varying to dark-brown without distinct marks except the three triangular spots on the upper face of the posterior femora and the light-colored lateral carinæ of the pronotum bordered below with black and within on the disk of the metazone by a black triangular spot. In some specimens, however, the top of the head, the disk of the pronotum, and the anal field of the tegmina are light yellowish-brown and the black stripe of the pronotum is expanded backward across the lateral field of the tegmina. The latter have the longitudinal veins unusually prominent and, except in the variety just described, they are faintly flecked with numerous small spots of darker than the ground color. The posterior tibiæ are reddish.

This species seems to be confined to the Pacific Coast. The United States National Museum contains numerous specimens from Yuba county and Butte county, California.

XXIX. *EREMNUS*, n. gen. Fig. 29.

Vertex somewhat declivent, broader than the frontal costa at the clypeus, sulcate, without a median carina, bounded by straight, sharp

but slight carinæ which meet at the front at an angle greater or less than a right angle. The lateral foveolæ are sub-quadrate, about twice as long as broad, very distinct and very apparent from above. The frontal costa is about half as wide at the vertex as at the clypeus, slightly sulcate with low broad carinæ along the sides. Seen from the side the face is moderately arcuate and moderately oblique. The antennæ are filiform, a little (female) or considerably (male) longer than the head and pronotum. The median carina of the pronotum is quite distinct and cut once behind the middle by the principal sulcus. The lateral carinæ are very strongly sinuate and the posterior margin of the metazone is roundly and very obtusely angulate. The lateral lobes of the pronotum are higher than long with the anterior and the posterior margins nearly straight and vertical. The mesosternal lobes are separated by a space several times as wide as long in both sexes. The metasternal lobes are separated by a space a little longer than wide in male and female. The tegmina and wings are well developed, not quite equaling or somewhat longer than the abdomen. The former have the scapular area transparent and filled with a single series of oblique cross-veins. The discoidal and ulnar areas have each a false vein with a single row of cells on either side. The posterior femora have three usually well marked sub-triangular or irregular brown spots on the upper face. The posterior tibiæ are red or yellowish with the spurs on the inner side much elongated and very unequal. The ovipositor is very slightly exerted, only the extreme tip being visible.

This genus is North American and so far as known is represented by two species which are apparently confined to the northern and western states. All the species seem to be partial to sandy and rather barren soil.

#### KEY TO EREMNUM, n. gen.

- A.<sup>1</sup> Tegmina very obscurely spotted or quite plain. 1.—*Deorum*, Scud.  
 A.<sup>2</sup> Tegmina usually distinctly and thickly spotted, never plain. . . . .  
 . . . . . 2.—*Scudderi*, Bruner.

#### 1. EREMNUM DEORUM, Scud. Figs. 29a, 29b.

*Chrysochraon deorum*, Scud., 1876. Bul. II, U. S. Geol. Surv. in Col., etc., 263.

*Chrysochraon deorum*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 55.

**Hab.** Garden of the Gods, Colo. (Scudder). The National Museum contains several specimens, one of them immature, which were

collected in the same locality. It does not seem to have been reported elsewhere unless it proves to be identical with the following species which is, I think, very probable. I have, however, too few specimens of this species to determine the matter positively.

2. EREMNUS SCUDDERI, Bruner.

*Aulocara scudderi*, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 63.

*Aulocara scudderi*, Townsend, 1893. Ins. Life, VI, 30.

*Aulocara scudderi*, Blatchley, 1894. Can. Ent., XXVI, 217.

*Philobostroma parva*, McNeill, 1891. Psyche, VI, 64.

As noted above, this species is likely to prove a synonym of *E. decorum*. One variety of this species has the vertex usually broad between the eyes with the anterior margins bounded by carinæ which meet at an angle much greater than a right angle even in the male. Ordinarily a structural difference of this character would indicate specific distinctness, but as this species seems to exhibit considerable variations in this respect, I think it not advisable to name it. I have received this variety from Prof. G. P. Gillette under the name of *Aulocara scudderi*, Bruner, and the form with the narrower vertex under the name *Dociostaurus coloradensis*. Both forms being named by comparison with specimens determined by Mr. Bruner.

**Hab.** Montana to Illinois, extending northward into British America and southward to New Mexico. It is said by Mr. Bruner to be a very common species west of the Mississippi. It is probably very rare eastward. I have found it in a few localities near Moline, Ill., where it seems to be confined to a few sandy hilltops along the Mississippi river.

XXX. STIRAPLEURA, Scud. Figs. 30a, 30b, 30c.

Vertex narrow, not exceeding half the short diameter of the eye, horizontal or slightly declivent, deeply sulcate with high lateral walls which meet at an acute angle in front and form a sub ellipse or a sub-hexagon open behind where there is always some trace of a median carina. The lateral foveolæ are rhomboidal once or twice as long as broad. The frontal costa is acuminate above, regularly divergent downward and sulcate throughout. Viewed from the side, the face is slightly convex and nearly perpendicular or moderately oblique. The antennæ are filiform short, scarcely exceeding the head and pronotum in length

even in the male. The disk of the pronotum is flat with all the carinæ distinct, the median being cut by the principal sulcus only in front of the middle. The lateral carinæ are very strongly sinuate in front of the middle. The posterior margin of the metazone is strongly angulate. The lateral lobes of the pronotum are higher than wide with the anterior and posterior margins nearly straight and vertical. A single or double series of somewhat irregular and broken carinæ extends more or less distinctly from the middle of the anterior border to or toward the upper posterior angle. The carinæ occupy the middle of a light stripe which is usually distinct and never entirely wanting. A usually more distinct but low broad carinæ extends from about the middle of the lateral lobes toward the lower posterior angle. This is also outlined by generally lighter and strongly contrasting color. The episternum of the mesosternum has a distinct high carina which extends from the hind coxæ toward the base of the tegmina. The mesosternal lobes are separated by a space much broader than long in both sexes and the metasternal lobes by a space as long as (female) or longer than (male) broad. The tegmina and wings are well developed, equaling or exceeding considerably the abdomen. The former have the scapular field transparent, and filled by a single series of oblique cross-veins. The discoidal area has a somewhat prominent intercalary vein and the ulnar area a weak longitudinal vein. The posterior femora have three distinct triangular brown spots on the upper surface. The posterior tibiæ are red or yellowish with the apical spurs on the inner side more or less unequal in length. The ovipositor is barely or moderately exerted.

*Stirapleura*, Scud., 1876. U. S. Geol. Surv. W. 100 Mer., App. JJ, 510.

In part, *Psoloïssa*, Scud., 1875. Cent. Orth., 25.

This genus is North American and Western, none of the five species known being found east of the Mississippi River.

#### KEY TO STIRAPLEURA, Scud.

- A.<sup>1</sup> Posterior tibiæ with the spurs on the inner side not very unequal.  
..... 1. — *Ornata*, Scud.
- A.<sup>2</sup> Posterior tibiæ with spurs on the inner side very unequal, the apical one being at least one and one-half times as long as the one behind it.
- B.<sup>1</sup> General color brownish or yellowish, varied with darker brown and black spots and stripes.

- C.<sup>1</sup> Lateral foveolæ about twice as long as broad.  
D.<sup>1</sup> Face but little oblique (male) or vertical (female). Scutellum of the vertex pentagonal with the posterior side of the pentagon missing. Median carina not distinct upon the summit of the head. Tegmina (female) scarcely exceeding the abdomen..... 2.—*Decussata*, Scud.  
D.<sup>2</sup> Face even in the female strongly oblique. Scutellum of the vertex elliptical with the posterior side of the ellipse open. Median carina distinct upon the summit of the head and accompanied by two supplementary carinæ. Tegmina far surpassing the abdomen in both sexes..... 3.—*Texana*, Scud.  
C.<sup>2</sup> Lateral foveolæ scarcely longer than broad... 4—*Delicatula*, Scud.  
B.<sup>2</sup> General color creamy white with a greenish tinge. Antennal sulci black..... 5.—*Eurotia*, Bruner.

1. STIRAPLEURA ORNATA, Scud.

*Dociostaurus ornatus*, Scud., 1876. U. S. Geol. Surv. W. 100 Mer., App. JJ, 507.

*Dociostaurus ornatus*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 58.

**Hab.** Northern New Mexico (Scudder).

This species has been reported but once. I have examined the type which is in Mr. Scudder's collection. The species to which it belongs undoubtedly belongs to this genus and it is distinct as shown by the sub equal inner apical spurs of the hind tibiæ, by the thick and somewhat clavate antennæ and by the structure of the vertex.

2. STIRAPLEURA DECUSSATA, Scud. Figs. 30a, 30b.

*Stirapleura decussata*, Scud., 1876. U. S. Geol. Surv. W. 100 Mer., App. JJ, 510.

*Stirapleura decussata*, Scud., 1880. 2nd Rept. U. S. Ent. Com., App. II, 26.

*Stirapleura decussata*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 57.

*Psoloëssa coloradensis*, Thos., 1876. Proc. Dav. Acad. Nat. Sci., 1, 252, pl. xxxvi, fig. 34.

**Hab.** Colorado (Scudder, Thomas); Colorado, Wyoming, New Mexico, Arizona, Montana (U. S. Nat. Mus.).

I have not seen the type of *S. decussata*, but it undoubtedly belongs to the genus which I have called *Stirapleura* and it agrees well in size and other particulars with *S. coloradensis*. It is very possible that

Thomas' name has priority as it was published in June. I have preferred Scudder's name, however, because it was the type of the genus.

3. STIRAPLEURA TEXANA, Scud. Fig. 30c.

*Psoloëssa texana*, Scud., 1875. Cent. Orth., 24.

*Psoloëssa texana*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 56.

*Pso'oëssa texana*, Coquillett, 1886. Rept. Com. Agr., 1885, 11.

*Psoloëssa texana*, Riley, 1893. N. Am. Fauna, 7, II, 252.

**Hab.** Texas (Scudder); San Joaquin Valley, California (Coquillett); Coso Valley, Southern California (Riley).

The United States National Museum contains several specimens from San Antonio, Texas, which I have referred to this species.

4. STIRAPLEURA DELICATULA, Scud.

*Scyllina delicatula*, Scud., 1876. Bul. II, U. S. Geol. and Geog. Surv. in Col., etc., 1875, 263.

*Scyllina delicatula*, Bruner, 1883. 3rd. Rept. U. S. Ent. Com., 58.

*Scyllina delicatula*, Riley, 1893. N. Am. Fauna, No. 7, pl. 2, 252.

**Hab.** Garden of the Gods, Colorado (Scudder); Southern California (Riley).

I have examined one of Scudder's type specimens and it seems to be distinct as shown by its short lateral foveolæ. It is, however, very closely related to *S. decussata*.

5. STIRAPLEURA EUROTIAE, Bruner.

*Psoloëssa* (?) *eurotia*, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 62.

**Hab.** Laramie River (Bruner).

This species is said by Bruner to feed solely upon *Eurotia lanata* or sweet sage or winter-fat as it is variously known.

XXXI. PSOLOËSSA, Scud. Figs. 31a, 31b.

Vertex very slightly declivent, narrow, being less than half the short diameter of the eye and scarcely equal to the width of the frontal costa at the clypeus. It is deeply sulcate with high carinæ which are parallel throughout the greater part of their extent and which meet in front at an acute angle and are somewhat incurved posteriorly where they continue more or less distinctly along the summit of the head in

company with a median carina which scarcely extends forward farther than the posterior margin of the scutellum. The lateral foveolæ are deeply impressed, sub-triangular in shape, and less than twice as long as broad; the posterior is at right angles to the lower carina and the upper is the strongly arcuate hypotenuse. The frontal costa is scarcely sulcate, acuminate below and considerably divergent to the ocellus, beyond which it is parallel for some distance and finally again divergent to the clypeus. The face seen from the side is gently arcuate and considerably oblique. The antennæ are short, scarcely equaling the head and pronotum, sub-filiform, a little flattened, and very little expanded apically, and acuminate at the apex. The pronotum is similar to that of *Stirapleura* except that there are no carinæ on the lateral lobes. The episternal carina is present and the mesosternal and metasternal lobes have the same structure as in that genus. The tegmina exceed the abdomen in both sexes. The former are very slender and the discoidal area is destitute of the intercalary vein and is usually occupied by a single series of cross-veins. The posterior femora are robust and clearly marked with the triangular brown spots usual in this group of the sub-family. The posterior tibiæ are reddish or yellowish with the apical spurs on the inner side very unequal. The ovipositor is moderately exerted.

*Psoloëssa*, Scud., 1875. Ent. Notes, IV, 86.

This is a North American genus represented by three species which are all South-western.

#### KEY TO PSOLOËSSA, Scud.

- A.<sup>1</sup> Anterior half of the tegmina not infuscated by the extension of the postocular brown band. Triangular brown spots on the upper face of the posterior femora sharply defined and very distinct.
- B.<sup>1</sup> Tegmina thickly and rather evenly maculate everywhere except in the scapular area. Ash brown . . . . . 1.—*Maculipennis*, Scudder.
- B.<sup>2</sup> Tegmina plain, reddish-brown . . . . . 2.—*Ferruginea*, Scudder.
- A.<sup>2</sup> Anterior half of the tegmina infuscated by the extension of the postocular brown band. Triangular brown spots on the upper face of the posterior femora less distinct . . . . . 3.—*Buddiana*, Bruner.

#### 1. PSOLOËSSA MACULIPENNIS, Scud. Fig. 31.

*Psoloëssa maculipennis*, Scud., 1875. Ent. Notes, IV, 87.

*Psoloëssa maculipennis*, Bruner, 1883. 3rd. Rept. U. S. Ent. Com., 56.

*Psoloëssa maculipennis*, Townsend, 1893. Ins. Life, VI, 31.

**Hab.** Texas to Southern California.

2. PSOLOËSSA FERRUGINEA, Scud. Fig. 31a.

*Psoloëssa ferruginea*, Scud., 1875. Ent. Notes, IV, 87.

*Psoloëssa ferruginea*, Bruner, 1883. 3rd Rept. U. S. Ent. Com., 56.

**Hab.** Dallas, Texas, (Scudder), Arizona.

The United States National Museum contains specimens from the last mentioned locality.

3. PSOLOËSSA BUDDIANA, Bruner.

*Psoloëssa buddiana*, Bruner, 1889. Proc. U. S. Nat. Mus., XII, 61, pl. i, fig. 6.

**Hab.** Carrizo Springs, South-western Texas (Bruner).

The National Museum contains one of Bruner's types of this species.

# SYNOPSIS OF PROCEEDINGS

## Davenport Academy of Natural Sciences.

1889—1896.

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[The records of routine and unfinished business are omitted from this Synopsis; also the minutes of a few meetings which, together with some official reports, have, unfortunately, been lost or mislaid.]

### *January 4, 1889.*—TRUSTEES' MEETING.

President C. E. Harrison in the chair, ten members present.

The matter of providing security on the note for \$320.00 held by Mrs. P. V. Newcomb was discussed but no action taken.

### *January 16, 1889.*—ANNUAL MEETING.

President C. E. Harrison in the chair.

#### RECORDING SECRETARY'S REPORT.

Present regular membership, 120; life members, 77. During the year 7 regular, 5 corresponding and 2 honorary members have been elected.

The list of deaths is a sad one—seven in all, viz: Life members, Hon. George H. French and William Riepe; regular member, John G. Dahms; corresponding members, Prof. A. K. Worthen and Prof. W. D. Gunning; honorary member, Dr. Asa Gray.

Fifteen Academy meetings have been held during the year with an average attendance of nine, this being also the average attendance at the Trustees' meetings held.

Interest has been revived in the Historical Section; it has held several meetings, increasing its membership by five.

#### LIBRARIAN'S REPORT.

The Librarian's report shows 2,046 volumes and pamphlets added in 1888, including the archæological and other publications of the principal foreign scientific institutions, with the reports of 19 government departments and many of those of the several states. One daily,

15 weekly, 20 monthly, 3 bi-monthly, and 6 quarterly publications are regularly received.

#### TREASURER'S REPORT.

The Treasurer's report shows total receipts, in the general fund, \$1,183.83; total expenditures, \$1,177.96, leaving a balance of \$5.87.

Reports were also read by the Corresponding Secretary, Curator, and Chairman of the Publication Committee.

Officers for the ensuing year (1889) were elected as follows:

*President* — Dr. JENNIE McCOWEN.

*First Vice-President* — WILLIAM RIEPE.

*Second Vice-President* — W. H. HOLMES.

*Recording Secretary* — Miss S. G. FOOTE-SHELDON.

*Corresponding Secretary* — Miss LUCY PRATT.

*Treasurer* — GEORGE BARKER.

*Curator* — W. H. PRATT.

*Librarian* — C. E. HARRISON.

*Trustees for three years* — JAMES THOMPSON, E. P. LYNCH, H. C. FULTON, C. H. PRESTON.

The following resolutions were presented and adopted:

*Resolved*, That in the recent decease, January 13, 1889, of William Renwick, Esq., a life member of this Academy and connected with its active membership since its first organization, we mourn the loss of a wise counselor, a generous patron, an agreeable associate, and a faithful friend;

That in deeply sympathizing with his bereaved relatives and friends, we indulge the hope that his sterling character, his unswerving devotion to duty and the best interests of the community in which he lived, his wisdom in planning and success in achieving worthy enterprises, may prove a stimulating example for imitation to those who come after him, and that the noble heritage of a good name may rest upon his only son, to be perfected with ever increasing lustre to coming generations;

That these resolutions be spread upon the records of the Academy, and that a copy of the same be engrossed and presented to the family.

G. P. MCCLELLAND,

C. C. PARRY,

J. B. PHELPS,

*Committee.*

#### PRESIDENT'S ADDRESS.

C. E. HARRISON, January 16, 1889.

#### MEMBERS OF THE ACADEMY, LADIES AND GENTLEMEN:

The completion of another whirling journey around the sun brings us together at this annual meeting, the twenty-first anniversary of our

organization, to briefly review some of the history of our recent past; to consider whether the accomplished work is commensurate with the opportunities of the term; the causes, if any, which may have operated to retard our progress; and to hopefully plan anew, that the coming year, in all that pertains to the growth and work of the Academy, may exhibit a fullness of life and zeal which will gladden us a twelve-month hence with its noble record.

Probably no other year in the life of our society, certainly none in the last decade, has been entered upon, clouded with such discouragements or so burdened with doubts and fears as the one just rounding to a close. The inroads which death has made, depriving us of the veriest elements of strength, had brought us to realize our weakened condition, thereby lessening in us that self-confidence which is almost an essential to success, and which before had inspired our earnest efforts. Whether these established feelings of loss and dejection, coupled with the real deprivations which caused them, have most contributed to minimize the interest manifested in Academy work, or whether, as is probable, the showing would have been more gratifying but for the inefficiency of your presiding officer, need not now be discussed.

The fleeting present and swiftly approaching future are all-sufficient to engage our earnest thought; for never, I dare say, in the long period of humble devotion to our commendable work did we approach a broader and riper field. Let us arise to the necessities of the hour, and at this beginning of the new year repledge ourselves to renewed and greater effort that the measure of the fullness already reached may not only be maintained but increased.

In the various processes and agencies for the development of the human mind there are ever present (even if not always apparent) evidences of the universal law of change and progress. The methods of today are different, in that they are better than the methods of the past. Object teaching, which but awhile ago was scarcely known, has come to be considered essential in almost every department of learning; and the day cannot be far distant when such institutions as the Davenport Academy of Natural Sciences, with their teeming and growing libraries and cabinets, and with memberships alive and devoted to high and noble aims, will be recognized as powerful and necessary factors in the general scheme of education. May we not confidently hope that then, at least, an enlightened public will accord them a fuller appreciation and more generous support?

The several reports already read in your hearing, while not indicative of an active year, yet give assurance that the Academy has at least in some slight degree moved forward in the direction of its higher destiny.

The publication of proceedings has ever been the most important feature of our work, if it has not in fact been the very life of our organization. The committee in charge of this department have not

been idle, and bring us a cheering record. Continuing the printing of Vol. V., which was previously begun, 88 pages have been completed and paid for—an increase of 25 per cent over the previous report, and a better exhibit than has been made for several years. The excellent portrait of Prof. D. S. Sheldon, the honored first president and lifetime friend of the Academy, which is to embellish the book, is provided and ready, and the volume, which approaches completion, will soon follow its predecessors, carrying the good name of Davenport and its Academy with honor to the libraries and savants of almost every land.

The Museum has received some valuable additions to its cabinets, though the showing here is less than in any one of recent years. Considerable improvement has nevertheless been made in this department whereby the Curator has been enabled to unpack and display many specimens not heretofore available to interest and instruct our members and visitors. The west basement room, with some slight alteration, has been put in order, and four large new cases (the need for which I mentioned in my address of last year) have been provided and set up at an expense of \$70 or more. No part of this amount has, however, been drawn from the treasury—thanks to a few tried and free-hearted friends. In this connection it is proper to remark, and I deem it worthy of record, that our valued and now lamented friend and fellow citizen, Hon. George H. French, whose generous aid the Academy had often known before, was the first to respond to this expression of her necessities. He promptly proposed to bear one-fourth the cost of all the cases, and doubtless thus made possible the securing the whole amount. The Horticultural Society, another faithful friend (I might say friends), with great unanimity also voted to contribute a fourth. The third giver of a like amount forbids the mention of his name; but such an act of liberality by one whose riches consist not so much of worldly goods as of goodness and greatness of heart, could not have been necessary to prove his abiding interest and love in and for the Academy, which, if not wholly springing from his own suggestions, is and has been, from the day of its beginning, the object of his constant self-sacrificing care and attention. The remaining fourth was contributed and partly collected by the Academy's ever-faithful friend and supporter, Mrs. Putnam. Thus in the extremities of need great-souled, ministering friends arise. The new room has already become a useful annex to the Museum.

The Library has maintained throughout the year its usual steady and gratifying increase. Its importance and value, per consequence, grow with its growth, and if the Academy accomplished nothing beside the accumulation of these treasures in our midst, its existence would be amply justified and all our contributions of time, effort, and means abundantly rewarded.

A considerable addition to the book-shelves, reported last year as urgently needed, has been supplied and freighted, and ere long there will again be heard a cry for shelves. Let us not turn from the welcome

sound. These precious volumes, filled with living thought, flow in to us from every portion of the habitable globe in exchange for our own publications. Every book is a messenger of cheer to encourage and sustain us; every book is an addition not only to the extent but to the intrinsic value and usefulness of the whole collection.

Fellow members, do we and do the citizens of this progressive city appreciate the wondrous worth of these possessions? The responsibility of caring for and nourishing this magnificent trust, and the far-reaching benefits, now and hereafter, which must accrue to the people of this vicinity through the benign influence of this great scientific library?

Our finances give evidence of prudent management. Expenses have been less than for the preceding year. Our indebtedness has been materially decreased while the income is practically unchanged. No particular cause for discouragement here. The Academy, adapting itself as always heretofore to its meager means, we have reason to hope is moving slowly but surely toward a place of less restraint and greater usefulness.

Briefly summing up the doings and happenings which have occurred since our last annual meeting, while both in and out of the Academy, there is much to encourage this and similar institutions, there is, withal, a tinge of sorrow. The vicissitudes of the unfolding year have brought us many blessings, some poignant griefs. In common with the whole world of science we mourn the loss of Asa Gray and George W. Tryon, whose names gave lustre to our roll of honorary members; of Professors W. D. Gunning and A. H. Worthen, both of whom lent their aid and influence as corresponding members. So, too, we lament the going out of the venerable E. F. Squires, of the brilliant Richard A. Proctor, and others who in the broad field of scientific research have largely lent their lives to the service of mankind. But to us, fellow members, the great leveler has dealt his severest blows. Within our immediate roll of regular members John J. Dahms is no more, while the list of life members is shorn of the honored names of George H. French and William Renwick, both of whom will long be remembered for their active interest and generous contributions in and to the Academy work.

When we look back upon the stricken roll of Academy builders, on those strong pillars of support which have fallen, no wonder we turn with hesitation, if not serious apprehension, towards the conflicts that lie before. But these have left us legacies of accomplished work, examples of noble, self-sacrificing devotion to the exacting aims and objects of this society, and in no way can we do greater reverence to their memories than by lending every effort to perpetuate and carry forward the beneficent work so well begun. If we doubt our own strength and ability we have but to turn to those bands of young students, the local chapters of the Agassiz Association, to find abundant hope for reinforcements.

In now retiring from the honorable station wherein, by your com-

mand I have tried to serve you, and having through both terms had continuous evidence of your forbearance, I beg to thank you for your confidence and constant kindness.

Relying upon the greater efficiency, if not more earnest endeavor, on the part of whomsoever may succeed me, and your necessary, usual, and cordial support of all the officers to be chosen, I join you in the hope that the Academy's twenty-second year may be also her most auspicious one.

*January 21, 1889.*—TRUSTEES' MEETING.

President McCowen in the chair; nine members present.

A committee, consisting of W. H. Barris, C. H. Preston, and W. H. Pratt, was appointed to devise plans for the furtherance of scientific work in the Academy.

It was voted to retain the present Curator and Janitor at their present rates of compensation, and to leave to the President and Curator the distribution of the new Academy keys.

On motion of Mr. J. B. Phelps it was decided to increase the amount in the savings bank (\$191.87) to \$200, from the general fund, this latter amount to be invested in a safe loan on real estate at the first opportunity.

*January 25, 1889.*—REGULAR MEETING.

President McCowen in the chair; ten members present.

Mr. W. H. Smith was elected to regular membership, and Prof. J. A. Udden of Augustana College, Rock Island, was made a corresponding member.

A short sketch of the life of the late William Renwick was presented by Dr. C. C. Parry.

Dr. Parry also proposed an amendment to the constitution making provision for associate membership, which proposal was referred to the Trustees for consideration.

Prof. Pratt then read an interesting paper on "Electricity," the subject being continued for discussion at the next regular meeting.

*February 22, 1889.*—REGULAR MEETING.

President McCowen in the chair; seven members present.

The Curator reported the addition to the museum of a collection of fossil plants from Mr. Sternberg of Lawrence, Kansas, comprising twenty species of deciduous leaves, rare and very valuable.

A paper was read from Prof. E. L. Berthoud of the School of Mines, Colorado, on "The Rediscovery of an Ancient Turquoise Mine in Arizona."

*March 18, 1889.*—TRUSTEES' MEETING.

President McCowen in the chair; eight members present.

The meeting was called to receive the report of the committee appointed January 21 to devise plans for the furtherance of scientific work in the Academy. The report of the committee recommended—

(1.) The utilization of the material of the museum, by means of illustrative collections from its shelves, for the instruction of students from the public schools and others in the various branches of science; and—

(2.) Increasing the usefulness of the Library by the preparation and publication of a catalogue or list of its contents.

The first recommendation had already, since the appointment of the committee, been put into successful operation by the Curator without waiting for the assured approval of the trustees. By arrangement with the Superintendent and principals of the public schools, twelve classes, comprising all of the eighth and ninth grades—432 pupils in all—had during the past three weeks spent each the last school hour of one afternoon at the Academy, deeply interested in the study of comparative anatomy, as shown in "The Teeth" of various animals in the Museum. The High School classes would follow soon, and the next subject taken up would probably be "The Mound Builders and Their Works." The report was received and the Curator's work was approved.\*

After much discussion it was decided to discontinue the work of thunderstorm observations, notifying observers to that effect by circular letter, and leaving to the United States Signal Service, which has just established a special system of observations in Iowa, the publication of data obtained.

*March 29, 1889.*—REGULAR MEETING.

President McCowen in the chair; six members present.

The reception, by exchange from Prof. O. W. Collett of St. Louis, of some flint implements from the Osage region was reported.

Prof. W. H. Pratt read an interesting paper on "A New Process of

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\*A detailed statement, by Prof. Pratt, of his work in this direction, will be found in the minutes of June 13, 1890.\*

Iron Manufacture," a process which promises to revolutionize present methods.

*April 5, 1889.*—TRUSTEES' MEETING.

President McCowen in the chair; ten members present.

The Treasurer reported a balance of \$45.61 in the general fund, with no indebtedness outstanding; also \$1,200 in the endowment fund, invested in real estate.

A request by letter from Prof. Frederick Starr that the Academy use its influence to induce Congress to publish his "Thunderstorm Report" was not complied with, as the Senate was about to adjourn, and the Government had undertaken similar observations.

*April 26, 1889.*—REGULAR MEETING.

President McCowen in the chair; eight members present.

The Corresponding Secretary reported a very gratifying reception accorded to Vol. V. of the PROCEEDINGS by scientific bodies at home and abroad.

The Librarian reported the receipt of several valuable bound volumes, including the three large illustrated quartos constituting the "Report of the U. S. Fish Commissioner," volumes which must delight the disciples of Izaak Walton.

The Curator reported, among other additions to the Museum, a curious, thread-like creature, 17 inches long by  $\frac{1}{32}$  inch in greatest diameter, found by a workman while sodding the dooryard of Mr. J. H. Harrison. It is different in important particulars from the *Gordia* or hair-snake, and is undescribed.

A letter was read from Mr. Edward Lovett of Brandon, England, desiring some Indian relics, and offering in exchange a set of specimens showing the manufacture of gun-flints, from the quarries at that place; also a letter from Prof. S. Calvin of the Iowa State University, on the "Formation of Sand."

Prof. B. Shimek of Iowa City was elected a corresponding member.

*May 31, 1889.*—REGULAR MEETING.

President McCowen in the chair; seven members present.

Only routine business transacted.

*June 17, 1889.*—CALLED MEETING.

President McCowen in the chair ; nine members present.

The meeting was called to consider the best course to pursue during the expected absence from the city, for the summer, of the Curator, Treasurer, and Corresponding Secretary. It was arranged that the Museum should be kept open to visitors as usual, the President being empowered to provide an attendant ; the treasurer's books and the cabinet keys being left in the hands of the Librarian, C. E. Harrison.

*August 30, 1889.*—REGULAR MEETING.

President McCowen in the chair ; eleven members present.

The name of Thomas H. Jappe was at his request dropped from the roll of members, he declining to pay arrearages of dues.

Dr. C. C. Parry presented a paper on "*Ceanothus L.* Recent Field Notes, with a Partial Revision of Species."

J. H. Harrison, W. H. Pratt, and Dr. Jennie McCowen were appointed a committee to investigate the feasibility of obtaining a reduction of postage on scientific matter connected with the Academy.

*September 20, 1889.*—TRUSTEES' MEETING.

President McCowen in the chair ; ten members present.

The publication fund being indebted to the chairman of the publication committee, Mrs. Putnam, to the amount of \$250—this sum being the excess of expenditure above receipts on Volume V. of the PROCEEDINGS to date—it was voted to repay the amount advanced, transferring the indebtedness to the general fund.

On motion the finance committee (H. C. Fulton, E. P. Lynch, and W. C. Putnam) were authorized to negotiate with Mrs. Patience V. Newcomb as to completing the purchase of, or reconveying to her, the four-foot strip of land adjoining the Academy lot on the north, they being given power to act.

*September 27, 1889.*—REGULAR MEETING.

President McCowen in the chair ; twelve members and several visitors present.

The Curator announced the receipt from Mr. Velie of a crocodile and several birds, all mounted.

The publication committee reported 180 pages of Vol. V. printed. Messrs. W. H. Bronson and M. Wheeler were elected regular members.

It was announced that classes from the public schools would be received the coming week.

Prof. Pratt then took up the subject of "Gravitation," presenting some original views which gave rise to an animated discussion. The subject was illustrated by beautifully executed diagrams and figures on the blackboard.

*October 25, 1889.*—REGULAR MEETING.

President McCowen in the chair; seven members and many visitors present.

An interesting lecture on "Coal Plants" was given by Curator Pratt.

*November 29, 1889.*—REGULAR MEETING.

E. S. Ballord, chairman *pro tem.*; seven members present.

Prof. P. C. Wolcott of Griswold College, and O. J. Gwynn, Assistant Signal Service Observer, were elected to regular membership.

Capt. W. P. Hall addressed the Academy on "The Markings of Ancient Pottery."

*December 27, 1889.*—REGULAR MEETING.

President McCowen in the chair; seven members present.

Messrs. E. P. Lynch, C. E. Harrison, and W. H. Pratt were appointed a nominating committee for the coming election of officers.

*January 3, 1890.*—TRUSTEES' MEETING.

President McCowen in the chair; eight members present

The treasurer reported receipts during the past year, \$889.42; expenditures, \$848.64.

*January 14, 1890.*—ANNUAL MEETING.

President McCowen in the chair; ten members present.

Reports of officers were presented, as follows:

RECORDING SECRETARY'S REPORT.

Beside the annual meeting there have been held during the year 10 regular meetings, with an average attendance of 8; 1 special meet-

ing, with an attendance of 9; 5 Trustees' meetings, with an average attendance of 9.

The following named societies have also held their meetings at the Academy rooms: The Agassiz Association, two chapters; the Scott County Medical Society; the Union Horticultural Society; and the Philomathian Debating Society.

Papers have been read before the Academy by Prof. W. H. Pratt on "Electricity," "Gravitation," and "A New Process of Iron Manufacture;" by Capt. W. P. Hall on "Markings of Ancient Pottery;" by Dr. C. C. Parry on "*Ceanothus*," or Jersey tea, and by Prof. E. L. Berthoud on "An Ancient Turquoise Mine in Arizona." Prof. Pratt delivered a lecture on "Coal Plants," and Mr. Thomas Brockett conducted a conversazione on "Spanish Antiquities."

The Academy has lost one regular member by death, and gained five regular members and one corresponding member by election during the year. The regular membership at present numbers 94.

There have been about 550 paying visitors to the Museum and as many more on business or by invitation.

January 14, 1890.

E. G. FOOTE-SHELDON, *Sec.*

#### LIBRARIAN'S REPORT.

The growth of the Academy Library for the year 1889 just closed, when compared with other years in our history, is gratifying indeed, the total additions being 3,019, or nearly 1,000 more than in the preceding year. These publications comprise the transactions of most of the scientific and historical societies of the world, as well as many Government and state publications. The contributions to science of many of the brightest minds of the day relating to scientific research and thought are rapidly accumulating, and building up in our midst a vast storehouse of literary treasures.

The additions to the Library were:

Bound volumes.....	115
Unbound volumes and pamphlets.....	2,472
Miscellaneous.....	431

The Library now contains—

Bound volumes.....	1,890
Unbound volumes and pamphlets.....	8,949
Miscellaneous.....	1,498

But little progress has been made in the preparation of the card catalogue. It is to be hoped that this may be pushed more vigorously, and that my successor may be able to accomplish more in the direction of this valuable and necessary work.

The shelf-room recently added will probably meet all the requirements for the coming year; but there yet remains, as has been suggested by those preceding me, an urgent need for the binding of many valuable pamphlets, maps, etc.

As evidence of the increasing value and usefulness of the Library, we find it more than ever sought by the public for information which cannot be readily found elsewhere.

Respectfully submitted.

C. E. HARRISON, *Librarian*.

January 14, 1890.

#### TREASURER'S REPORT.

The Treasurer's report showed no balance in the general fund. The amount of receipts and expenditures for the year, to date, were reported at the last 'Trustees' meeting.

#### ELECTION OF OFFICERS — 1890.

*President* — Dr. JENNIE McCOWEN.

*First Vice-President* — WILLIAM RIEPE.

*Second Vice-President* — W. H. HOLMES.

*Recording Secretary* — Miss S. G. FOOTE-SHELDON.

*Corresponding Secretary* — Miss L. M. PRATT.

*Treasurer* — E. P. LYNCH.

*Librarian* — C. E. HARRISON.

*Trustees for three years* — (The four retiring Trustees were re-elected.)

Rev. A. M. Judy, W. H. Holmes and others spoke in commendation of the unselfish and impartial work being done by the Curator, work connecting the Academy with the public schools.

Mr. Judy suggested and advised an annual encampment of the Academy for collections and study, something after the Chautauqua plan.

President McCowen stated that, owing to unusual pressure of professional duties during this season of prevailing "grippe," she had not been able, as yet, to prepare the usual annual address.

#### February 21, 1890. — CALLED MEETING.

President McCowen in the chair.

The President stated that the meeting was called to take action with regard to the funeral of Dr. C. C. Parry, it having been arranged that the body should lie in state at the Academy rooms before being taken to Trinity Church for the funeral services.

The President appointed W. H. Barris, James Thompson, and William Riepe a committee on resolutions of respect, and E. H. Hazen, W. C. Putnam, and Isaac Rothschild as an escort to accompany the

remains from the residence to the Academy building on Sunday morning. Dr. J. W. H. Baker, G. P. McClelland, William Riepe, and S. P. Bryant were appointed bearers.

The following resolutions were reported and adopted :

WHEREAS, The inevitable end of life has come to our esteemed and respected fellow citizen and co-worker in the field of scientific investigation, Dr. Charles C. Parry, and left us to mourn the loss of his gentle presence and the guidance of his wise counsels ; and,

WHEREAS, In his demise the Academy has lost not only one of its ablest members and its second Vice-President, but also one who, whether at home or abroad, whether pursuing his favorite botanical studies in the field or summing up their results for the benefit of science in general, never forgot for a moment the child he helped so much to attain a standing in the world — the Davenport Academy of Natural Sciences -- therefore be it

*Resolved*, That we mourn the irreparable loss, not only of a brother member but also of a genial, companionable, modest, true, and ever reliable friend, known in every land where his favorite science of botany is pursued.

*Resolved*, That this Academy attend the funeral obsequies of our fellow member in a body.

*Resolved*, That these resolutions, feebly expressing the sympathy of this Academy, be presented to the bereaved family of the deceased.

*Resolved*, That these resolutions be entered in the minutes of the Academy, that a copy be furnished for publication in the city papers, and that, in token of our grief, the Academy be draped in mourning for thirty days.

*March 3, 1890.*—REGULAR MEETING (adjourned from Friday, February 28).

President McCowen in the chair ; eleven members and about twenty visitors present.

The Curator reported the donation by William and George Ahrens of Haypole, Nebraska, of a catamount, the head and skin of an antelope, two prairie dogs, and a white owl, which were being prepared for preservation.

The order of the evening was the illustration, by Prof. Pratt, of Foucault's experiment demonstrating the rotation of the earth on its axis. A 72-pound ball was suspended by a 30-foot wire extending from the dome of the rotunda through the first floor to just above the floor of the basement. The ball, surrounded by a screen to cut off disturbing air currents, was drawn six inches to one side and held there by a thread. Having been left thus for a long time so as to be perfectly still, it was released at 8 o'clock by burning the thread, and allowed to swing in an exact north and south direction. The Professor, by means of a convenient turntable constructed for the purpose,

proceeded to show that a ball, while suspended from a bracket attached to the wheel and turning with it, when started to swinging in a certain direction, had a tendency to continue its swing in the same direction as at first, and that, the table being revolved horizontally, the direction of the swing of the ball would not change with it. Thus an ant, for example, being upon the table and observing the swing of the ball and not being aware of the movement of the surface on which he stands, would see the direction of swing constantly changing in relation to a graduated circle on the surface beneath the ball. It was explained that we are in similar circumstances on the surface of the planet whose motion is imperceptible to us as we move with it. Hence, as the ball swings on a circle drawn upon the floor, the floor itself, turning with the building and the earth's surface, changes its position under the swinging ball whose direction does not change, just as the turntable changes under the small ball as above described. It was shown that at the pole such change would be around the entire circle in 24 hours while at the equator there would be no change.

After some further explanation of details and discussion of the subject the meeting adjourned at 9:30 to the museum and basement to see how the ball was acting. Truly enough, it was found to have apparently changed from the north and south direction and was swinging about ten degrees east of north and west of south. Then it was realized that not the swing of the ball but the position of the building itself had thus changed, and that in  $1\frac{1}{2}$  hours a visible motion of rotation of the earth had taken place, producing the relative displacement due to this latitude.

*March 28, 1890.*—REGULAR MEETING.

President McCowen in the chair; nine members present.

A vote of thanks was extended to Mr. L. M. Crawford of Vinton, Iowa, for valuable specimens donated, and for his offer of gratuitous services as taxidermist.

President McCowen and Curator Pratt were instructed to call on Mrs. C. C. Parry and express the desire of the Academy to retain in its museum the valuable herbarium collected and deposited by Dr. Parry.

The Curator then took up the vexed subject of the "Antiquity of the Mound Builders," citing evidence and authority for the claim that they antedate all known Indian races or tribes.

*April 25, 1890.*—REGULAR MEETING.

President McCowen in the chair; eleven members and several visitors present.

Additions to the Museum were reported as follows: A specimen of fungus, together with some flint implements, from Crawford county, Iowa, and a specimen of topaz from Mexico, presented by M. E. Reid; also, some minerals from the salt-mines of Germany.

Mr. Warren Watson of Kansas City and Dr. W. R. Sedbury of Detroit were elected corresponding members.

Mr. F. J. Walz, local Signal Service observer, then delivered an instructive lecture on "Meteorology," explaining the methods and instruments used in the Government service, also the more prominent atmospheric changes the concerted observation of which makes possible fairly accurate prognostications. Factors entering largely into the calculations of the bureau are the direction and force of the wind, and these are influenced by three things — unequal atmospheric pressure, the specific gravity of the air, and the rotation of the earth. The lecturer explained the workings of the barometer, showed that a high barometer indicated heavy atmospheric pressure, and a low barometer the opposite. He then cited the self-evident fact that the air in an area of heavy pressure had a natural tendency to rush into an area of light pressure, and invariably did so. Thus, owing to the weather bureau having reduced its barometrical observations and comparisons to an exact science, it is enabled to locate storm centres with exactitude. It has barometers placed all over the country. Their results are corrected for variations in the instrument, for altitude, and for temperature; and every day these figures are placed upon a chart or map of the United States in all of the signal service stations. Lines are then drawn from stations showing a certain atmospheric pressure to other stations showing the same pressure. These lines naturally resolve themselves, especially in times preceding a storm, into a comparatively regular series of concentric circles, the center being the area of lowest pressure. The natural conclusion is that the winds are going to tend from the outside area of denser atmosphere to the inner area of less pressure. The charts drawn on the 27th of last month, just before the heavy storm which occurred on the evening of the 28th, showed a very pronounced storm center in the central region of the country. The chart for the 28th showed the storm center moved several states to the east, while on the 29th the storm was located on the Atlantic coast

and just getting ready to pass onto the ocean. The progress of the storm was shown to the audience as plainly as though it were being watched in reality.

*May 9, 1890.*—SPECIAL MEETING.

By special request Sergeant Walz delivered a lecture supplementary to that of April 25, taking up the subject of "Weather Proverbs." Mr. Walz believes that many of the old proverbs are the result of long and shrewd observation of atmospheric phenomena, and he treated the subject in an interesting and convincing manner.

*June 13, 1890.*—REGULAR MEETING—adjourned from May 30.

President McCowen in the chair; twelve members and several visitors present.

The following report of the work of the Academy in connection with the public schools was submitted by Prof. Pratt, and referred to the publication committee:

DAVENPORT ACADEMY OF NATURAL SCIENCES, }  
June 13, 1890. }

In order to make the history of the Academy lessons to classes from the public schools thus far a matter of record, I desire to offer a brief report of that work, which was concluded for this school year on the 21st of last month, May, 1890.

In accordance with a proposition from the Academy and its acceptance by the school-board in February, 1889, as heretofore reported, six courses of lessons have been given; one lesson each on six different subjects to each of the following classes, viz.: the eighth and ninth grades of all the city grammar schools and all grades of the high school. The subjects, dates, and attendance were as follows, viz.:

*First Series.*—On "Teeth." February 27 to March 26, 1889; 18 lessons; aggregate attendance, 509 pupils, 20 teachers.

*Second Series.*—"The Mound Builders and Their Works." April 10 to May 17, 1889; 16 lessons; attendance, 551 pupils, 18 teachers.

*Third Series.*—"Primitive Rocks; the Story of a Few Pebbles." May 20 to June 18, 1889; 14 lessons; attendance, 493 pupils, 16 teachers.

*Fourth Series.*—"Coal Plants and Their Products." September 29 to October 25, 1889; 19 lessons; attendance, 660 pupils, 22 teachers.

*Lesson to Eighth Grade of School Year 1889-1890 only.*—"The Mound Builders and Their Works." February 3 to February 11, 1890; 7 lessons; attendance, 243 pupils, 9 teachers.

*Fifth Series.*—"The Vertebral System in Man and Animals." Feb-

ruary 12 to March 13, 1890; 19 lessons; attendance, 550 pupils, 20 teachers.

*Sixth Series.*—"Crystallization." April 28 to May 21, 1890; 15 lessons; attendance, 480 pupils, 16 teachers.

Aggregate, 108 lessons; attendance, 3,581 pupils, 121 teachers; average attendance, 33.16 pupils, 1.12 teachers.

Extra lessons given were—to Davenport teachers (evening), 1; Orphans' Home classes, 2; Kemper Hall class, 1; public (evenings), 2; Lend-a-Hand class, 1; Rock Island school classes, 2; Moline high school class, 1. Total, 10.

Superintendent Young, in his annual report, July, 1889, makes favorable mention of these lessons as a part of the public school instruction of the year, three series having then been given.

The work has received the approval of the patrons of the schools without exception so far as I have learned, and has been popular with pupils and teachers, and I have had many and frequent evidences of awakened interest and observation of natural phenomena among the children, and some very gratifying and kind testimonials of their appreciation.

This plan of coöperation with the public schools, which is original with ourselves, met with the most cordial approbation of scientific persons and educators elsewhere, and has been favorably noticed in various scientific publications.

Though it was an experiment previously untried, and has been carried out but to a limited extent as yet, it is already sufficient to fully demonstrate its feasibility, usefulness, and popularity, and to show unmistakably that it could be advantageously extended to one or two lower grades, and that all might attend somewhat oftener—each class coming once in each month if no more.

Having thus introduced this method and given it as I believe a fair and reasonably successful trial, my confidence in its usefulness and importance, both to the schools receiving instruction and to the institution affording it, is greater than ever; and I would here express the hope that it may be continued under still more favorable conditions, and become a regular system and part of the public school course of instruction, and may exert a strong influence in favor of an extension of natural science instruction in the school rooms. W. H. PRATT.

In view of his contemplated early removal from the city Prof. Pratt then presented an address on "The Academy's Past and Future," which, after extended remarks on the needs of the institution by W. H. Holmes and others, was referred to the Trustees for consideration and action.

President McCowen was chosen to represent the Academy at the coming meeting of the American Association for the Advancement of Science.

*October 3, 1890.*—TRUSTEES' MEETING.

President McCowen in the chair; nine members present.

Prof. W. H. Barris was appointed acting Curator for the remainder of the year in place of W. H. Pratt, resigned, at the same salary—\$500 per annum.

*October 8, 1890.*—CALLED MEETING.

President McCowen in the chair.

The meeting was called to take leave of Prof. W. H. Pratt, he, with his family, being about to remove to Minneapolis, Minn., for permanent residence.

An earnest expression of the regret felt by his Academy friends at his departure was given in an address by James Thompson; and another long-time friend and associate, William H. Holmes, in a few well-chosen remarks, presented him, on behalf of the Academy, with a large photograph album containing the portraits of many of his associate members. At the close of the meeting the following resolutions were presented and unanimously adopted:

WHEREAS, Prof. W. H. Pratt, one of the founders of the Davenport Academy of Natural Sciences and for so long a time its efficient Curator, is about to sever the close relationship that has existed between himself and the Academy through so many years of devoted and earnest labor on his part for the upbuilding and maintaining of the institution;

*Resolved*, That the members of the Academy hereby express their heartfelt regret at the necessity for his departure from this the field of his life's labor, of work which has always been thoroughly and conscientiously performed for the best interests of the institution so dear to his heart, for the upbuilding and firm establishment of which he has done more than any other one person. We desire hereby to place on record an evidence of our appreciation of his earnest labor and of our respect and love for him as a scientist and man. It is our heartfelt desire that peace and success may be with him in his new home, and our strong hope that this Academy may so grow in usefulness as to reflect additional honor on him to whom is due so much of the credit for what it has done and for what it is yet capable of doing.

At a meeting in November, at which four members were present, President McCowen gave an interesting account of her recent trip to Arizona and of her visit to the cliff dwellings near Flagstaff.

*December 26, 1890.*—REGULAR MEETING.

President McCowen in the chair; six members present.

Dr. Radenhausen presented for inspection some fossil shells found in the quarries below the city ; also some meteorite fragments.

The following resolutions of respect were presented and adopted :

WHEREAS, In the sad and sudden termination of the earthly life of Prof. W. C. Preston by the electric car accident of September 1 last, the Academy has lost an active member, cut off in the prime of his life and usefulness ;

*Resolved*, That we mourn his loss not only as a member of this Academy but as an able educator, a genial gentleman, and a social friend.

*Resolved*, That these resolutions be entered on the minutes of the Academy, that copies be furnished for publication in the city papers, and that a copy be sent to the bereaved family.

JAMES THOMPSON,  
FRANK NADLER,  
E. S. BALLORD,  
*Committee.*

A committee was appointed to prepare resolutions of respect to the memory of the late Ross Woodmansee ; and J. H. Harrison, F. Nadler, and F. E. Stratton were appointed a nominating committee for the approaching annual election of officers.

#### *January 7, 1891.*—ANNUAL MEETING.

President McCowen in the chair.

The reports of officers were read and ordered placed on file.

#### RECORDING SECRETARY'S REPORT.

The Recording Secretary's report showed the present membership to be as follows: Regular members, 78; life members, 70; honorary members, 11. Six regular members have died and 11 have removed from the city during the year.

#### LIBRARIAN'S REPORT.

#### TO THE OFFICERS AND MEMBERS OF THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

Your Librarian begs to report the condition of the Library as follows: The total number of additions for the year 1890, exclusive of our city papers, is 1,746. These additions comprise the transactions and reports of about 100 scientific, philosophical, and historical societies in the United States and Canada, and of 150 foreign societies; the publications of the U. S. Government, scientific and statistical, of eighteen of the general departments at Washington, received regularly; the geological reports of fourteen States, and the agricultural, historical, statistical, health, and other publications of nearly all the States of the Union.

Of periodicals received regularly there are 11 weekly, 17 monthly, 1 bi-monthly, and 4 quarterly. Of many of these the Academy is in possession of full files.

The Library now contains — bound volumes, 1,920; unbound volumes, pamphlets, and miscellaneous papers, 22,558.

With the bare mention of thousands of pamphlets, many of them containing the results of original investigations in every department of natural science, and at times accompanied by the most costly illustrations, we are confronted with the practical question of their preservation. It comes up as one of our greatest needs. They call for a wise discrimination and division, binding those that are the most important and procuring for others cases in which they may be properly classified and labeled, for protection and ready reference.

The reading table is furnished with the new publications as they are daily received; and the books already on the shelves are consulted almost daily by persons seeking information on some of the subjects contained in them, every facility being afforded those who choose to avail themselves of the opportunity during the hours the Academy is open to visitors.

The cataloguing of the Library by subjects, commenced some time ago, though progressing slowly, is receiving daily attention as far as our limited force will admit.

With the daily accessions to the Library emphasis is given to the recognized value of the publications of the Academy by the frequent requests coming from new organizations in this country and the older institutions abroad, proffering their own issues in exchange for ours.

January 7, 1891.

C. E. HARRISON, *Librarian*.

#### CURATOR'S REPORT.

The Curator's report showed valuable additions to the Museum in its several departments. No mound explorations had been made during the year. In closing, Curator Barris said:

We have come to a point in our history where the further accumulation of new materials is not so important as the utilization of what we already have in abundance — the arrangement, classification, and systematic cataloguing, especially of our geological and mineral treasures, so as to do credit to an academy of science. In urging this I am but giving expression to the cherished hope of your first curator, and none more than himself would rejoice at its realization.

#### REPORT OF THE PUBLICATION COMMITTEE.

The committee reported Part 1 of Volume V. printed and ready for distribution. Fewer scientific papers than usual had been presented for publication in the past year, chiefly because of the lack of funds on

the part of the Academy to publish them promptly. Frequent requests for our published PROCEEDINGS were continually being received from home and foreign institutions.

## TREASURER'S REPORT.

TO THE OFFICERS AND MEMBERS OF THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

I herewith respectfully submit the Treasurer's report for the year ending January 7, 1891:

## RECEIPTS.

From Dues.....	\$195 00
Memberships .....	5 00
Annual subscriptions, 1890.....	323 00
Contributions .....	7 00
Subscriptions, 1891.....	30 00
Use of rooms and door receipts.....	93 65
Interest on endowment fund.....	80 00
	—————\$733 65

## DISBURSEMENTS.

Paid on account of Curator.....	\$391 60
Janitor .....	60 00
Fuel .....	23 65
Light .....	10 85
Water .....	16 00
Freight and express.....	8 15
Incidentals, including postage and repairs.....	76 99
Note at Davenport National Bank.....	100 00
Interest .....	43 11
Cash on hand.....	3 30
	—————\$733 65

## LIABILITIES.

Note to Mrs. Newcomb, 8 per cent.....	\$320 00
Davenport National Bank.....	450 00
Due Curator.....	125 00
Gas Company .....	70
A. J. Lerch & Bro.....	6 45
Jarvis White & Co.....	13 40
	—————\$915 55

## FUNDS AVAILABLE.

Endowment fund .....	\$1,200 00
Uncollected dues .....	118 00
Uncollected subscriptions .....	64 00
	—————\$1,372 00

C. E. HARRISON, *Acting Treas.*

The resignation of W. H. Holmes as Trustee was presented and accepted.

## ELECTION OF OFFICERS—1891.

*President*—JAMES THOMPSON.

*First Vice-President*—Dr. W. L. ALLEN.

*Second Vice-President*—W. H. HOLMES.

*Recording Secretary*—Dr. JENNIE McCOWEN.

*Corresponding Secretary*—Prof. W. H. BARRIS.

*Curator*—Prof. W. H. BARRIS.

*Treasurer*—FRANK NADLER.

*Librarian*—Miss A. J. S. McCrum.

*Trustees for Three Years*—G. P. McCLELLAND, W. C. PUTNAM, W. H. BARRIS, and A. M. JUDY.

*Trustees to Fill Vacancies* (caused by the death of William Riepe, the removal from the city of W. H. Pratt, and the resignation of W. H. Holmes)—Mrs. C. E. PUTNAM, C. E. HARRISON, and W. L. ALLEN.

#### PRESIDENT'S ANNUAL ADDRESS.

Dr. JENNIE McCOWEN, January 7, 1891.

The retiring President, Dr. McCowen, after summing up in brief the progress of the year, making special and appreciative mention of the work of Prof. Pratt connecting the Academy with the public schools, continued as follows:

From the very inception of this Academy one of the principal objects has been the advancement of public interest in knowledge of the natural sciences, and especially by the most intimate practical co-operation with the public educational system. To this end it has been the constant effort on the part of the Academy to encourage visits of classes and teachers to the rooms, but no way was found during past years to realize this cherished object to anything like the extent hoped for. But within the past year (1890) a promising beginning has been made.

At a meeting of the Board of Education in February a definite plan proposed by Prof. Pratt, then Curator of the Academy, for receiving classes of pupils from the public schools directly into the Academy rooms for systematic scientific instruction was considered and approved. A programme was arranged by the principals, and all parties entered into it with hearty good-will. At the afternoon recess a teacher, with her class, repaired to the Academy building, where an ample collection of specimens to illustrate the lesson given by Prof. Pratt was arranged for the close and personal inspection of the pupils; the same lesson being repeated until all the classes had received it in turn. The high school and the eighth and ninth grades of the grammar schools have taken one lesson each during each term.

This plan, which originated with the Davenport Academy of Natural Sciences, has been sufficiently tested to demonstrate the entire feasibility, usefulness, and popularity of the method. It has, more-

over, become plain that the same might be advantageously extended to one or two lower grades. The obvious advantage of this method is that it makes possible a much more complete illustration with the actual objects than could be made by means of such collections as could be found at each school. The present arrangement as to time presents no material interference with regular school work.

The removal of Prof. Pratt from the city is a serious loss to the Academy in the prosecution of this work no less than in many other ways; but we hope some arrangement may speedily be made for continuing the Academy classes.

While we express the keenest regret that, hedged about by sharply limiting conditions, much of the desirable work of an academy is, as yet, impossible of accomplishment, we may congratulate ourselves on what has been done by dint of personal exertion on the part of those who, busy all day in the vocations by which a livelihood must be earned, have yet spared for science an occasional hour. We own our building free from encumbrance, and enough ground for the extension and completion of the building as contemplated in the original plan.

The value of the collections, especially in the archæological department, is very considerable. A careful estimate has placed the actual money value of the building and contents as scarcely short of \$100,000. A painstaking examination of the records, made by the late Curator, shows that of that amount the following has been received from the community during the past 22 years:

Fees and dues.....	\$ 5,325 00
Proceeds of lectures.....	325 00
Proceeds of entertainments.....	1,950 00
Total .....	\$ 7,600 00
Cash contributions and life memberships.....	\$11,000 00
Total .....	\$18,600 00

For the \$7,600 the patrons have had in return the usual privileges of membership. Of the \$11,000 donated a very considerable portion has been contributed by the active members themselves, while about \$1,000 has come from distant friends. Of the balance, it certainly is not extravagant to assume that it has been fully returned to the public in the reputation abroad which it has given the city; for in every scientific institution of the world the name of Davenport is well known, the Academy of Sciences having been a potent factor in the very best kind of advertising — that which shows not only business activity but the force of intelligence and education, which appreciates and cultivates all sources of material and intellectual welfare, than which none can be with less justice overlooked than scientific labor and scientific knowledge.

In the material prosperity with which Davenport is being blest, as the years go by, and which of late seems to be taking on new activity

in every direction, so much is due directly to the results of scientific study, research and experiment, that it is inconceivable that an institution whose chief aim is scientific study and the dissemination of scientific knowledge should not be adequately sustained, should not have a share in the general prosperity which it has helped to forward.

And now, gentlemen, in retiring from the office with which you have honored me for two terms in succession, allow me to express my appreciation of the honor which I accepted not as a personal matter but as a compliment to my sex, which, from the beginning of the institution, as has been acknowledged many times, has been active in promoting its interests. Your flattering preference has found scant justification, as I confess with regret, owing to the active duties of professional life which leave but limited opportunities for the adequate promotion of all the interests of the Academy, such as might reasonably be expected of its chief executive. I thank you for the cordial support and co-operation which you have ever given me as your presiding officer and for the uniform courtesy and consideration accorded me personally. The harmony, hopefulness, and good feeling of these years, in spite of the very heavy burdens and very great disadvantages under which we have labored, give me undisguised satisfaction; and as we begin the new year, 1891, I trust it may indeed prove to the Academy a happy New Year of new zeal and high resolves, of greater achievements, of a wider range of usefulness, of a better understanding in the community of our purposes, and in consequence thereof, a more substantial support.

#### INAUGURAL ADDRESS.

JAMES THOMPSON, January, 7, 1891.

President Thompson, on taking the chair, paid a graceful tribute to the efficiency of his predecessor, and after modestly recognizing the fact that "He who putteth on the armor may not rejoice like him who putteth it off," said:

A word or two on the threshold of the new year may not be out of place. How often have the older members wished and hoped that they might live to see this institution endowed with funds sufficient to carry out the original design of its founders and to enable it to get out of this hand-to-mouth beggarly way of life. O, men of means and influence! when plans are being laid for the improvement and enriching of our beautiful city let it not be forgotten that this institution, even in its youthful state, has made Davenport better known in the world than any other, than all other institutions together. If it has done so much in its adolescence, under such difficulties, what may it not do when it is enabled to stand on its feet, self-supporting and independent? What a chance for some Davenport Girard or Peter Cooper to step forward and endow the academy, to thus bless it and

the city, and in so doing doubly bless himself. Surely it were better to see the good one does before going hence to be no more on earth than to leave one's wealth to be fought over and scattered to the winds.

And let me say a word to the young men of the city, many of whom are drifting into idleness and crime, just for want of a purpose: Remember we do not live by bread alone. The mind needs food as well as the body. What a chance is yours to come here and learn of Nature and her ways. Here are books and specimens and every inducement to go out and investigate for yourselves the wonders of the world we live in.

A fine example for young men is that of our former librarian, H. A. Pilsbry. Working at his trade of printer he put in his spare moments in the study and classification of shells, and is now professor of conchology in the Philadelphia Academy of Science. He thirsted for knowledge, searched for the spring, and drank deep. There are a great many springs right here in this academy to begin on if you are thirsty—and it would be a good thing to begin now. This is a kind of thirst that no man need be ashamed of, and what pleasure there is in the search for the springs of truth. Lessing says, "If God held all knowledge in his right hand and in his left the desire to search for truth, and asked me to choose, I would fall reverently on his left hand and say, Father, give!" In the search for knowledge lies happiness, and in the strength of the endeavor lies its secret recompense.

*January 30, 1891.*—REGULAR MEETING.

President Thompson in the chair.

The auditing committee appointed at the last meeting reported the accounts of the Treasurer for the past year examined and found correct.

The Curator reported as the most interesting addition to the museum during the month a colored drawing made by an Indian convict.

Rev. George K. Hoover was elected a regular member, and Mr. S. F. Smith a Trustee to fill the vacancy caused by the election of James Thompson to the presidency.

The President announced the appointment of standing committees for the year as follows:

*Finance*—W. C. Putnam, E. S. Ballord, Dr. W. L. Allen.

*Publication*—Mrs. M. L. D. Putnam, H. C. Fulton, Prof. W. H. Barris, Dr. C. H. Preston, James Thompson.

*Library*—Miss A. J. S. McCrum, C. E. Harrison, Rev. A. M. Judy.

*Museum*—W. H. Pratt, Archæology; Miss S. G. Foote-Sheldon, Conchology; Prof. Jerome McNeill, Entomology; Prof. W. H. Barris, Geology and Palæontology; Dr. E. H. Hazen, Natural History;

Frank Nadler, Mineralogy ; J. J. Nagel, Botany ; J. M. DeArmond, Historical Collections.

*February 27, 1891.*—REGULAR MEETING.

President Thompson in the chair.

Dr. A. W. Elmer and Mr. Louis Block were elected regular members.

*March 27, 1891.*—REGULAR MEETING.

President Thompson in the chair.

Hon. John C. Bills was elected to regular membership.

The Secretary was instructed to call in all the keys of the Academy building for change of lock and redistribution to authorized holders.

A letter was read from Prof. W. H. Pratt on "Inheritance of Acquired Characteristics." An informal discussion of the subject followed.

*April 24, 1891.*—REGULAR MEETING.

The following resolutions were read and adopted :

*Resolved,* That we have learned with deep regret of the death of Prof. Alexander Winchell, a corresponding member of this Academy. Specially gitted for his life's work and prosecuting it with conscientious and persistent enthusiasm, he was everywhere recognized and appreciated by his co-laborers in the cause of truth. Whether viewed as author, educator, or scientist, he had achieved in each field the equally high distinction of national reputation.

*Resolved,* That we extend our deepest sympathy to the family in their great bereavement, and that copies of these resolutions be sent them.

*May 29, 1891.*—REGULAR MEETING.

President Thompson in the chair ; five members present.

Routine business only was transacted.

*July 31, 1891.*—REGULAR MEETING.

Rev. George K. Hoover, President *pro tem* ; five members present.

A communication was read from Capt. Willard Glazier asking the Academy to send a representative to join an expedition to explore the head-waters of the Mississippi river, he to pay all expenses for a six weeks' trip. No member feeling ready to spare the requisite time, the

Secretary was instructed to inform Captain Glazier of the Academy's regret at not being able to avail itself of his generous offer.\*

*September 25, 1891.*—REGULAR MEETING.

President Thompson in the chair; six members present.

The curator reported a collection of over 300 specimens, representing more than 30 species of fossil shells from the Hamilton group, made recently by himself at Rockford, Illinois, and presented to the museum of the Academy. The number of paying visitors (about 125) during the past month, had been larger than usual, owing to the River Carnival and Fair.

Mr. C. E. Harrison was requested to prepare a sketch of his recent trip with the Glazier expedition to the head waters of the Mississippi and present it at an early date.

*January 6, 1892.*—ANNUAL MEETING.

The Academy met in regular annual session, President Thompson in the chair.

After some discussion it was decided to adjourn to the first Wednesday in February to receive the reports of officers.

*February 3, 1892.*—ANNUAL MEETING.

(Adjourned from January 6.)

Eleven members present.

The President being absent on account of illness, Vice-President Allen occupied the chair. The reports of officers were presented and ordered placed on file.

CURATOR'S REPORT.

It is natural at the close of the year, to ask as to the present status of the Academy. Is it realizing the expectations of those most interested in its welfare? Is anything being done to make it attractive to the people? As one of the officers of the Academy, and simply from the standpoint of the Curator, we reply to these questions:

First, as to additions made to our cabinet. These are considerably in advance of those made in the past year whether we consider their numbers or value. Accessions have been made in almost every de-

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\* Mr. C. E. Harrison finally arranged to accompany the expedition.

partment of natural science — geology, mineralogy, palaeontology, ornithology, archæology, conchology, entomology and botany.

Among the extensive collections are a series of fossils from the Rockford shales of this state, comprising about 30 species and between two and three hundred specimens, all of which have been properly labeled and are on our shelves.

Another and most remarkable addition has been made by Prof. Shimek of Iowa City, comprising many species of sea urchins, basket fish, serpent stones, crabs and corals from the Atlantic and Pacific coasts, and land and water shells from Tennessee, all in excellent condition, identified and labeled by the giver, who has made special study of the objects presented. The Academy is most fortunate in securing such a donation.

Mr. Wickham of Iowa City has generously furnished to the Academy the first installment of a series of specimens in entomology to supply deficiencies, and perfect our already extensive collection, in that department.

Mr. Williams of St. Louis has favored us with over a hundred botanical slides, supplying a want much felt in the Academy.

We notice in the next place the opportunities for the Academy to afford instruction have, the last year, been unusually favorable. Specialists have taken occasion frequently to visit us for study in their several departments. The archeological department has been in especial favor. A new impulse has been given to the study by the insertion in our primary geographies of one or two chapters on the Mound Builders. Hence teachers have not only come from a distance to acquaint themselves with the works of an ancient race now passed away, but during the past year whole schools, accompanied by their teachers, have frequently visited the Academy.

Is anything being done to awaken an interest in the community in behalf of the Academy? Before answering this question let me say the great work, the legitimate work of this Academy, has been and is now being realized in its publications. They stand as the cause, aim and end of its existence. In our non-appreciation of this fact we may ignore it, but our ignoring does not change it. The frequent applications of scientists for the special papers published in our fifth volume, to aid them in completing their work, and the frequent enquiries as to when the sixth volume will be ready for distribution, made by leading societies of Europe and of this country, show their appreciation of the work.

And now for the practical question, "What are we doing now to incite a popular interest in the Academy?" The curator has adopted the expedient of accompanying each visitor through the museum and explaining to him the several objects of interest claiming his attention. The success of this direct personal effort is evinced not only in the increasing number of visitors but in their uniform expressions of appreciation of that which they see and hear. The teaching function of the institution is thus made prominent, and is extended most freely to all

who choose to place themselves within the reach of its exercise. The year has certainly shown what may be accomplished in this direction. Definite ideas are thus gathered as to the varied objects of natural history upon our shelves. As a consequence visitors go away satisfied with and emphasizing their satisfaction with what they have learned. A new interest is thus awakened which it is hoped will go on deepening, and doubling in intensity, and in time it is hoped it may become a powerful factor for permanent good to the Academy.

I need not say this has been a work of time, and has interfered most materially with the special labor which the curator most desired to accomplish. This labor was partially outlined in his last report. He there emphasized the necessity of a thorough revision of the fossils contained in our collection. It will be remembered that many of the specimens gathered at an early date were deposited on the shelves with scarcely any notice other than that of locality, some wanting even that. These required study and identification. No science has made more rapid advances during the past twenty years than that of palæontology. New genera and new species are constantly being discovered and described, so that the nomenclature of to-day is widely different from that of a few years ago. This change calls for an entire and radical change in the classification of our fossils. The work is in satisfactory progress and would have been finished but for the frequent interruptions to which reference has been already made. The curator has procured a book in which will be recorded the names of fossils as given years ago and then the new names by which they are now known, with full references to the authorities in accordance with which the changes have been made.

Thus, it seems from the standpoint of the curator the past year has brought with it much to encourage us. It has witnessed the gradual increase of the museum, as well as valuable additions to its collection. It has ministered to the necessities of those who most needed its aid. Its teaching power has been brought into contact with every visitor and its efficiency abundantly proven, and it is hoped the special work of the curator in the palæontological department will issue in a thorough scientific classification of the palæontological treasures now scattered over its shelves.

W. H. BARRIS.

February 3, 1892.

#### LIBRARIAN'S REPORT.

#### TO THE OFFICERS AND MEMBERS OF THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

The library of the Academy for the year just closed has exhibited a very gratifying growth, the accessions numbering 1,702, exclusive of the daily papers, the present total being 26,203. It was thought best at the beginning of the year to discontinue registering a great amount of matter which daily comes to us and is of no value or interest on the shelves, else the number would have been much larger.

The additions comprise the reports of most of the scientific societies of the world, reports of the many departments of the Government, files of various scientific journals and periodicals, geological State surveys, and reports from nearly every State in the Union, representing almost every subject pertaining to the natural sciences.

Slow progress has been made during the year upon the index catalogue previously commenced, the limited time of those in charge of the Library permitting them to give but a small part of their labor daily to this work. The great needs of the Library—and these are assuming immense proportions—are the binding and preserving of the many thousand unbound volumes and pamphlets, and the completion of the index. I trust the day is not far distant when provision will be made for these pressing needs, greatly enhancing the value of this department of the Academy.

February 3, 1892.

C. E. HARRISON, *Librarian*.

#### PRESIDENT'S ANNUAL ADDRESS.

JAMES THOMPSON, February 3, 1892.

The following address, prepared by Mr. Thompson as a review of the year's work was, in his absence, presented by his daughter:

FELLOW MEMBERS OF THE DAVENPORT ACADEMY OF NATURAL SCIENCES—LADIES AND GENTLEMEN:

I believe it is the rule as well as the custom for the President of the Academy to give an annual address, a summing up of the year's progress. I am of the opinion that in my case this rule would be better honored in the breach than in the observance, inasmuch as the material is scant, the laborers few, and the skill to exhibit what little there is, sadly lacking. It is like making bricks without straw, and consequently the task is rather difficult. It may be true that in looking at the years passed over and the labor spent we are ready to exclaim, in the words of the poet—

Of all sad words of tongue or pen,  
The saddest are these: It might have been.

It might have been that we would have seen the Academy building extended to its originally contemplated dimensions, if—if—! It might have been that some big-hearted, rich lover of science would have endowed the society with a fund large enough to place it upon a sure and lasting basis, if—if—! It might have been that greater numbers of young men, imbued with love of science, would have followed the example of some of the earlier workers and trained themselves to continue the work begun, if—if—! It might have been that some of us might have done more and better than we have, if—if—! All these and more might have been, if—; but each one can fill out the sentence to please himself.

But despite difficulties, hopes not realized, and regrets for what

might have been, we still live ; and with the means at our disposal we have no reason for discouragement. "Things are not always what they seem." Failure and success are relative terms. What often seems failure is embryonic success, resulting in the birth of improved methods, clearer intelligence, better work and higher attainments. Every one is familiar with examples of this in studying the history of events as they transpire. The very things that seem to destroy and overwhelm are, by some occult alchemy, changed into deliverance and salvation. The very wrath of men is made to praise and hold up the truth. For example, the War of Independence seemed disastrous, but it resulted in the birth of a nation and the independence of a great people. The shot at Fort Sumter and the first battle of Bull Run had a disastrous look, but we now know that the black cloud had a silver lining and culminated in the emancipation proclamation of Abraham Lincoln and the surrender of Lee to Grant at Appomattox. We have notable examples of this in our own institution. But for the assertions of some professors of science in a national institution—but for this seeming evil, we would never have seen that able and unanswerable defense of our institution and relics as given to the world by our late lamented President, Charles E. Putnam, which resulted not only in proving the genuineness of the relics as found and the honesty of the finders, but of convincing the scientific world of the same—proofs of which convictions come to us from almost all scientific bodies in Europe as well as America.

Speaking reminiscently, we must not fail to remember gratefully and regretfully our former fellow member and Curator, W. H. Pratt : gratefully when we think of his zeal and untiring labor for so many years in building up and keeping in order our collections : regretfully when we think of his departure to another city just as he was beginning to develop a favorite theory of his, viz, making our Academy an efficient auxiliary of the public school, by taking classes weekly, and teaching practically, visually and orally the nature of the things and animals which they have read about in their books. It is not too much to hope that some one equally capable and imbued with equal zeal will take up this work so auspiciously begun and carry it forward to a successful issue. The heart fills with sorrow and the eye with tears as, year by year, numbers of our efficient members leave us, some to other places, as Fulton, Pilsbry and others, but the greater number to join the silent majority—Sheldon, the Putnams, father and son, Farquharson, French, Riepe, Renwick, Adams, Preston and others. Verily they rest from their labors and their works follow them, while we sadly miss them in their accustomed places and long for the "touch of a vanished hand." Still speaking reminiscently, we must not fail to mention with admiration the unflagging enthusiasm and successful labors of the Chairman of the Publication Committee, Mrs. M. L. D. Putnam. Able, efficient and persistent in her efforts from the first ; meeting the objections of the few opposers who doubted the wisdom of publishing the proceedings ; she has been the projector of

ways and means as well as the collector of the funds which have made the publication a success, which has been the means of making us as well as, if not better known abroad than at home; thus by its success compelling the acknowledgement of the doubters and the public generally, of the wisdom and the benefit of our publication, the importance of which we must keep constantly in view and endeavor to raise a permanent publication fund in order that original papers can be published in due time before they are sent out to the world from other sources. I believe a great many more papers would be sent to us if it were assured that they would get immediate publication.

Leaving the imperfect review of the past we come face to face with the present, and of course the prospect of providing for the future. And first we will note, with thanks to the same indefatigable worker, the successful completion of her efforts in the renewal of, and adding to the subscriptions for the Curator's salary, thus securing, as you will see by the report, that necessary expense for the next five years. In the absence of a permanent fund it is a grand thing to be able to say that so much is provided for.

We are all aware that nothing has been done for some time in outdoor excursions, exploring mounds or adding any new discoveries to the museum. Alas! The old field marshals are either gone or laying up in ordinary, and we are sadly in need of new recruits in this field of interesting labor, and it is hoped that a revival may take place in this direction. In the exceedingly interesting lectures of the University Extension Course on Geology, Prof. Calvin mentioned the rich region, geologically considered, lying in the vicinity of Montpelier, down the river some twenty miles, and intimated that an excursion to that locality would take place some time in the spring, and that he would accompany the party and describe, *in situ*, the strata that he had exhibited on the black-board. Would it not be well for us to be represented in that excursion and report to the Academy whatever of interest may be pointed out by the professor? It may be well to state here that the Academy is pleased to extend the use of its library room to the Quiz classes of the University Course with such books from the museum as they may need, to carry on their work. You will see that the Curator reports additions in almost every department of natural history, and work done in his own special line. In conclusion permit me to suggest that, as you are aware, the great Columbian World's Fair is to be held in Chicago next year, and also that a new book by the editor of the *American Antiquarian* entitled "The Mound Builders, Their Works and Relics," is to be published in the spring, which will contain a description of the Davenport relics. Now, as we have the honor of holding in our possession by the right of discovery, a unique relic of prehistoric art, as well as a survival of prehistoric civilization, the genuineness of which has been proven by honest and unimpeachable witnesses, I think it would be advisable if possible to send our tablets and some other mound builder's relics, such as the elephant pipe, copper axes, etc., as part of the Iowa or Davenport exhibit, so

as to give visitors from all parts of 'the' world a chance to see something that has made a little stir in the scientific world and now is only waiting, like the Rosetta Stone, for some Marietta to decipher the story hidden in its hitherto undecipherable hieroglyphics.

## ELECTION OF OFFICERS — 1892.

*President* — JAMES THOMPSON.

*First Vice-President* — DR. W. L. ALLEN.

*Second Vice-President* — W. H. HOLMES.

*Recording Secretary* — DR. JENNIE McCOWEN.

*Corresponding Secretary* — PROF. W. H. BARRIS.

*Curator* — PROF. W. H. BARRIS.

*Treasurer* — FRANK NADLER.

*Librarian* — C. E. HARRISON.

*Trustees for three years* — DR. C. H. PRESTON, S. F. SMITH, W. F. ROSS, H. H. ANDRESSEN; the latter two taking the places of Messrs. H. C. FULTON and E. P. LYNCH, recently removed from the city.

Dr. A. W. Elmer was elected a trustee to fill the vacancy caused by the removal of Dr. E. H. Hazen to Des Moines.

A vote of thanks was extended to Mrs. M. L. D. Putnam for her work in securing a \$400.00 subscription to meet current expenses. The thanks of the Academy were also extended to Mr. W. F. Ross for an invitation to attend the meetings of the Davenport Humane Society.

The following resolution, presented by Rev. A. M. Judy, was unanimously adopted:

Recognizing an inestimable advantage to learning in the accumulation of a scientific Library such as this Academy is acquiring, chiefly through the exchange of its publications, for the proceedings of other learned societies;

*Resolved*, That the public of Davenport is earnestly solicited to contribute toward the cost of the forthcoming volume of the Academy Proceedings.

Messrs. Judy, Allen, and C. E. Harrison were, on motion, appointed a committee to devise means of increasing interest in the museum.

*February 11, 1892.* — REGULAR MEETING.

Vice-President Allen in the chair.

The committee appointed to draft resolutions expressive of the Academy's sense of loss in the death of its honored President reported as follows:

WHEREAS, In the inevitable order of events death has again invaded the membership of the Academy and stricken down our honored and beloved President, James Thompson, who for twenty-four years, or nearly the entire period of the Academy's existence, has been one of its faithful friends and supporting members ; therefore —

*Resolved*, That while the community at large—the city of his adoption and home, has suffered a great and grievous loss, the Davenport Academy of Natural Sciences is most sorely stricken, having long had the benefit of his counsel, aid, and fellowship, with opportunity to know and appreciate the beauty and symmetry of his sterling character.

*Resolved*, That we place his name with reverence and love upon the proud and precious roll of our honored dead.

*Resolved*, That the Academy extends to the bereaved family the assurance of sympathy and condolence.

T. W. McCLELLAND,

W. F. RIEPE,

J. H. HARRISON,

*Committee.*

*March 25, 1892.*—REGULAR MEETING.

President Allen in the chair.

After the usual reports the subject of an exhibition of the Academy's collections at the World's Fair was discussed but no action taken.

*April 29, 1892.*—REGULAR MEETING.

Ten members present.

Resolutions on the death of J. M. Parker and of Nicholas Kuhnen were passed, and a large crayon portrait of the late president, James Thompson, was presented by Mr. Harrison on behalf of the family.

President Allen appointed the following standing committees for the year:

*Finance* — J. B. Phelps, C. A. Ficke, H. M. Henley.

*Publication*—Mrs. M. L. D. Putnam, W. H. Barris, C. H. Preston, J. B. Young, Prof. S. Calvin.

*Library*—C. E. Harrison, Miss A. J. S. McCrum, A. M. Judy.

*Museum*—W. H. Pratt, Archæology ; Miss S. G. Foote-Sheldon, Conchology ; W. H. Hatch, Ichthyology ; Miss J. Sanders, Entomology ; W. H. Barris, Geology and Palæontology ; F. Nadler, Mineralogy ; A. W. Elmer, Natural History ; J. J. Nagel, Botany ; J. A. De Armond, Historical Collections.

E. S. Hammatt was elected a regular member.

## IN MEMORIAM—J. MONROE PARKER.

WHEREAS, The hand of death has removed from among us our life-long associate and life member, J. Monroe Parker;

*Resolved*, That in his death the Academy has lost a member whose kind words of encouragement have always cheered our efforts and whose generous aid has ever been ready to assist us.

*Resolved*, That while we deplore his death as a great loss to us, we will ever cherish the memory of his kindness and support of all good works, and his most generous provision for the future of this Academy.

*Resolved*, That these resolutions be spread upon our records and a copy thereof be sent to the bereaved widow and children.

E. S. BALLORD,  
S. F. SMITH,  
WILLIAM J. ROSS,  
*Committee.*

## IN MEMORIAM — N. KUHNEN.

Again has death invaded the ranks of the Academy and taken away one of its foremost members, Nicholas Kuhnén. It is fitting that we come with reverent hearts to offer this tribute to his memory.

A firm friend of the Academy in its time of need, a loyal citizen to every public duty, a courteous gentleman in every relation of life, generous to a fault, it might be said of him, "His life was gentle, and the elements so mixed in him that Nature might stand up and say, 'This was a man.'"

It is ordered that a copy of this minute be presented to the bereaved family, and that the Academy wear the usual badge of mourning for thirty days.

GEO. P. MCCLELLAND,  
S. P. BRYANT,  
C. E. HARRISON,  
*Committee.*

*May 27, 1892.*—REGULAR MEETING.

President Allen in the chair.

A letter from Prof. S. Calvin of Iowa City was read, accepting a position on the publication committee. "But for its publications," he wrote, "the Davenport Academy of Natural Sciences, notwithstanding all the brilliant names it has had and still has on its roll of membership, would never have been known outside of Davenport. As it is, the publications of the Academy, with their important contributions to the sum of human knowledge, have made Davenport honorably known, at least among men of science, throughout the civilized world. The cultured people of your beautiful city, when they realize what the Academy has done and is capable of doing, will, I am sure,

rally to its support, and will see to it that its usefulness from the point of view of science, and its usefulness from a more selfish point of view, in advertising the intelligence and progressiveness of Davenport, shall not be hindered or impaired."

The Curator reported the donation from the Hon. Whit. M. Grant of a very remarkable specimen of mica-schist containing numerous garnets. On motion a vote of thanks was extended to Mr. Grant.

The fine specimens of fur-seal skins of different ages, previously donated by Mr. Grant, were brought out for discussion as to the causes operating toward the extermination of the seal.

The following resolution was presented and adopted:

*Resolved*, That the publication committee be instructed to publish the papers now on hand, and such as may hereafter be accepted by the Academy, in brochure form, as soon after their reception as practicable, and issue them at once (without delaying for the completion of a volume) to such subscribers and exchanging societies as may elect to receive them thus.

*October 28, 1892.*—REGULAR MEETING.

President Allen in the chair; seven members present.

The Curator mentioned, among recent donations to the Museum, a handsome slab of crinoidal limestone, presented by Mrs. C. C. Parry.

The chairman of the publication committee reported Volume V. of the PROCEEDINGS in the hands of the binder, and three papers presented for Volume VI.

Curator Barris announced that he would, as requested by the committee, prepare a paper on "The Local Geology of Davenport," for Volume VI.

A comprehensive Index to the first five volumes of the PROCEEDINGS, was announced as in course of preparation, under the direction of Prof. W. J. McGee of Washington, D. C.

The following resolution of respect to the memory of Mrs. J. Monroe Parker was adopted:

*Resolved*, That in the death of Mrs. J. Monroe Parker this Academy realizes the loss of a firm friend and a life member of this institution, and would place on the minutes this recognition of her interest in its welfare.

MRS. C. E. PUTNAM.

W. H. BARRIS,

W. H. HOLMES,

*Committee.*

*December 14, 1892.*—TWENTY-FIFTH OR "SILVER ANNIVERSARY"  
MEETING.

In the afternoon the Museum was thrown open to the children of the city, music being furnished by a children's orchestra. In the evening there was a fair gathering of interested friends in the main Academy hall.

An interesting sketch of the history of the Academy from its beginning, December 14, 1867, was read by Dr. Jennie McCowen; and letters from absent friends were read conveying many expressions of good will.

A delightful musical programme was rendered by the Misses Bruning, Mrs. Swiney, Miss Hoyt, and others. A bountiful repast was served in the supper hall, and altogether the anniversary proved a very enjoyable occasion.

ANNIVERSARY ADDRESS.

DR. JENNIE McCOWEN, December 14, 1892.

LADIES AND GENTLEMEN:

The Davenport Academy of Natural Sciences was organized December 14, 1867, just twenty-five years ago to-night.

Of the four gentlemen who met that night in a dingy little office upstairs on the corner of Third and Perry streets and pledged themselves to united efforts towards the acquirement and dissemination of scientific knowledge, towards the encouragement of scientific research and the promotion of practical scientific instruction in the public schools, not one remains to-day in active membership in the Academy. Of the first year's officers of that infant society not one remains. Of the ten gentlemen who formed the first Board of Trustees, but a single one remains, Dr. W. H. Barris. At the end of 1868 the membership had increased from four to fifty-four.

The first donation from abroad to the new museum was a collection of *crinoids* from Mr. Enoch May of Burlington.

The first lot of specimens received in exchange was a collection of marine shells, sponges, etc., from the Portland, (Me.) National History Society, an institution which has long since ceased to exist.

The first case for holding specimens was a home-made one, manufactured for the Academy by one of the original members.

The first lecture under the auspices of the Academy was by Prof. Gustavus Hinrichs, then of the Iowa State University, given at the German Theatre.

The first paper read in Academy meeting was on "The Relation of the Outer World to Our Senses," by Mr. W. H. Pratt, who, during the twenty-four years that have elapsed since that time, has been un-

tiring in his devotion to the Academy and has but recently transferred his residence to another city.

That this infant society anticipated the good advice of Dr. Edward Everett Hale in an inclination to "Look up and not down," is shown by the fact that its first purchase of a scientific nature was a telescope. This instrument is still in the possession of the Academy and has been from time to time the source of much pleasure and profit.

During the early years of the existence of the Academy it accepted the hospitality of the Library Association and one and another office of private individual or firm, but as time passed on it grew until it could no longer be accommodated in the house of its friends, and in 1873 it became an independent householder and paid rent at the rate of \$6.00 a month for a small room. We cannot trace our history step by step, but in 1877 — in our tenth year — the corner stone of the Academy building was laid, and in February of the next year, the building was completed and opened to the public with much ceremony and great rejoicing.

In looking over the early records of the society I was interested to find that the first woman proposed for membership was a physician — Dr. Delia S. Irish — though owing to her intended absence from the city her name was afterwards withdrawn. The first elected to membership was Mrs. M. L. D. Putnam, who is still an active member. The first elected an honorary member was Mrs. M. A. Sanders.

From the very beginning of the Academy the women of the city have been interested in it and have done what they could for its advancement. As early as January 18, 1868, scarcely a month from the date of organization, an entry shows that "Mrs. M. A. Sanders contributed a large collection of minerals, fossils and recent shells, which alone filled a cabinet case." And not long after, we find mention of a "Ladies' Furnishing Fund," which provided "seven cases for specimens and books, matting for the floor, curtains, etc."

When sufficient scientific material had been accumulated to warrant the publication of Proceedings, it was made possible by the Woman's Centennial Association. The lot for the new Academy building was given by a woman, Mrs. Patience V. Newcomb. In 1879, a woman, Mrs. M. L. D. Putnam, was elected to the presidency, a thing then unheard of in the scientific world, (an indiscretion which was repeated at a later date in the election of Dr. McCowen in '90, and her re-election in '91.)

Time forbids more than mere mention of many good works; among them, of the efforts of father and son, Charles E. and J. Duncan Putnam, each notable in his own way in building up the Academy and protecting its interests.

The gentlemen of the Academy, now present, who have borne the heat and burden of the day, can bear testimony to the fact that, commenced without funds and year by year through two and a half decades, having to contend against the difficulty of want of means to prosecute its work to the best advantage, yet the Academy has lived,

and more, has grown; and further, has secured recognition even in foreign countries as one of the American Academies worthy of a place among scientific institutions.

Of the material prosperity with which Davenport is being blest, so much is due directly to the results of scientific study, experiment and research, that it is inconceivable that any institution whose chief aim is scientific study and the dissemination of scientific knowledge, should not be adequately sustained. The exact knowledge which is sought in scientific pursuits is the sure ground of prosperity, and comparing to-day with fifty years ago and realizing that the almost inconceivable advances which have been made all along the line are chiefly the result of *applied* science, we can but expect that the Academy, too, will share in the general forward movement inaugurated in our city.

EXTRACTS FROM ANNIVERSARY LETTERS.

Prof. E. L. Berthoud of Golden, Col., a member of the New York Lyceum and of the Philadelphia Academy of Science, wrote:

Assure the members of the Academy to whom I owe the honor of being a member, that I warmly appreciate the honor conferred and look forward with pleasurable anticipation to the time when I may be permitted to attend a society meeting. I am preparing for a winter's trip south to Mexico, and anything I may see that is archæologically interesting will be duly imparted to the Davenport Academy.

Prof. T. S. Parvin of Cedar Rapids:

You know the deep interest I feel in the welfare of the Davenport Academy, and I trust that your anniversary occasion may serve to interest some of your wealthier citizens who may lend a helping hand and so contribute to its further usefulness.

Edward K. Putnam, Detroit, Mich.:

I wish I could be there to help celebrate the silver anniversary of the Academy. I really miss the Academy here. The Chicago Academy, as you may know, has received a gift of \$75,000. Davenport's turn will come some day.

Robert H. Lamborn, New York City:

I hear from time to time of the good work you are doing and am thereby impressed with the great importance of local academies like yours. I have recently been instrumental in starting one at Grand Junction, Colorado, which is already doing valuable work.

W. C. Brewster, New York:

I do not know of anything that would afford me more pleasure than an opportunity to meet my old friends on an occasion like the silver anniversary of the Academy of Natural Sciences.

Prof. W. H. Pratt. Minneapolis:

We should each and all feel a just and reasonable pride in the great value and excellence of the work done—largely by those who are gone—resulting in the establishment of one of the most creditable and valuable institutions in Davenport.

George F. Henry, Des Moines:

The history of the Davenport Academy has been one of honor, a credit to all its members, and, putting it in a position of deserved prominence in the scientific world, may well be made a matter of congratulation and pride.

*January 4, 1893.*—ANNUAL MEETING.

President Allen in the chair; nine members present.

REPORT OF THE PUBLICATION COMMITTEE.

The Chairman, Mrs. Putnam, reported Volume V. of the PROCEEDINGS now in the hands of the binder, and the first pages of Volume VI. already printed.

The Publication Endowment Fund, started by the late Prof. S. D. Sheldon by the payment of \$50.00, entitling him to all the publications of the Academy, has been added to in equal amount by Charles Velie, of Evansville, Indiana, and Austin Corbin, of New York City.

The Academy sends its PROCEEDINGS to all Scientific, Historical and Art Institutions, and to authors or publishers of Scientific or Historical Works, in exchange for their own or other publications.

Since the last annual meeting we have sustained a great loss in the death of President James Thompson, a most earnest advocate and supporter of this particular branch of the Academy's work, and especially helpful in his sympathy and faith in the future of the publication. The Academy is most fortunate in having secured the consent of Prof. Calvin, of Iowa City, to act in his place on the Publication Committee.

CURATOR'S REPORT.

The Curator submitted the following report:

The additions to the museum for the past year have hardly averaged those recorded in preceding reports. While small contributions have occasionally been made, there have been no large accessions in any department of Natural History. The museum has had a better opportunity than heretofore to test its teaching qualities and thus practically widen its influence. This is especially noticeable in the fact that a more than usual number of schools, with their teachers, have come from the neighboring state to avail themselves of the opportunity

of familiarizing themselves with an exhibit of the varied works and remains of the Mound Builders. These, as object lessons, have appealed to the senses and thus illustrated the knowledge they have derived from the teaching of their text-books.

In addition to such instances, parties engaged in the pursuit of special studies have regularly resorted to our rooms for the prosecution of their work. Every effort has been made by the Academy to facilitate such work by the proffer of the free use of the varied material upon our shelves for examination and comparison, while the books in our library have, for the time being, been placed at their disposal. The thorough modern classification of our large array of fossils, recommended years ago, and even then insisted on as a necessity by your former Curator, Prof. Pratt, has been commenced and prosecuted to a considerable extent. The fragmentary and otherwise imperfect condition of specimens has made it a slow, tedious task, while the daily interruptions to which your Curator is subjected have helped still further to cripple him and sadly interfere with the early accomplishment of the work. Respectfully submitted,

January 4, 1893.

W. H. BARRIS, Curator.

#### LIBRARIAN'S REPORT.

TO THE OFFICERS AND MEMBERS OF THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

Your Librarian begs leave to report 1458 additions to the library for the year just closed, these additions comprising the transactions of scientific societies, government and state publications, etc., are regularly received in exchange for our own publications. As stated in the report of your Librarian one year ago, the means of properly caring for and preserving this valuable collection are wholly inadequate. There has been no binding done, nor shelf room provided during the year, both of which are urgently needed. To relieve our immediate wants for shelf room, I would recommend that the present shelving in the library room be extended to the ceiling, thus utilizing much valuable space. Respectfully submitted,

January 4, 1893.

C. E. HARRISON, Librarian.

#### CORRESPONDING SECRETARY'S REPORT.

During the past year the Secretary has written 113 letters and received 107. The correspondence has been mainly in reference to the publications of the society and applications for the same.

In addition to these a large number of letters have been received acknowledging the receipt of publications. Our regular forms for such acknowledgement have been exhausted, and to write them out in full has devolved on the Secretary an unusual amount of labor.

Respectfully submitted.

January 4, 1893.

W. H. BARRIS, Corresponding Secretary.

## TREASURER'S REPORT.

## RECEIPTS.

Balance on hand February 6, 1892.....	\$ 7.84
Subscriptions and dues.....	492.11
Door receipts.....	42.95
Interest.....	49.00
Cash and other donations for cleaning Academy.....	56.66
Entertainment.....	14.50
Sale of publications.....	4.00
	<hr/> \$667 06

## DISBURSEMENTS.

Curator's salary to January 2, 1893.....	\$455.86
Fuel, light and incidentals.....	138.11
Publication fund.....	4.00
Cleaning Academy.....	56.66
Water.....	12.00
Balance on hand.....	.43
	<hr/> \$667 06

Respectfully submitted,

January 4, 1893.

FRANK NADLER, *Treasurer.*

## PRESIDENT'S ANNUAL ADDRESS.

DR W. L. ALLEN, January 4, 1893.

## LADIES AND GENTLEMEN:

The year 1892 has passed, marked with but few events of importance in the history of the Academy.

The Curator's report shows that the Museum has received the usual number of additions, with, however, a falling off in the number of mound builders' relics. We ought to enlarge our natural history collection so as to have at least one specimen of every bird and animal to be found in Iowa.

The Librarian's report shows a continued and most wonderful growth of our Library, 1,430 books and pamphlets having been received during the year, some of them of very great value. Our Library now numbers 27,500 books and pamphlets, and although it is of the greatest value we have not adequate room for its proper preservation.

The report of the Recording Secretary shows that our meetings have been few and but poorly attended, and that our membership has consequently not increased. Early in the year our worthy President, Mr. James Thompson, was taken from us, and at about the same time occurred the death of Mr. Nicholas Kuhn and of Mr. and Mrs. J. Monroe Parker.

I recommend that we devote the meetings in March, June, September, and December to certain subjects, and that we procure papers or lectures for those quarterly meetings. The intermediate meetings can be devoted to the routine business which interests but few of our members.

The publication committee reports that a part of Volume VI. is in the printer's hands, while Volume V. is still waiting for its index, and is otherwise ready for binding.

The Treasurer's report for the past year shows our receipts to have been equal to our expenditures, and that we still have a debt of about \$400. During the year the Academy has received notice of four bequests, namely: \$1,000 from Mr. J. Monroe Parke, \$1,000 from Mr. Nicholas Kuhn, \$1,000 from Mrs. J. Monroe Parker, and \$1,000 from Mr. E. Newbold. With an additional endowment of \$10,000 the Academy would have an ample income for its maintenance without rendering it necessary that a few of its enthusiastic members devote a large amount of their time annually to the unpleasant and thankless task of circulating a subscription paper. With the endowment safely secured we should not then find it a difficult matter to enlarge our building so as to exhibit to best advantage our unequaled collections of mound builders' relics. In our basement are hundreds of valuable specimens of the pottery and implements, and many boxes and barrels containing the bones of that extinct race.

Through the indefatigable efforts of Mrs. Putnam the Academy can at last boast of a thorough house-cleaning and renovation.

On December 14. the twenty-fifth anniversary of the organization of the institution, the ladies of the Academy gave a very delightful concert, followed by an informal reception, which was enjoyed by a number of our friends and members.

This is not the time to deliver an address on the subject of mound builders, but I cannot be too emphatic in stating that a natural pride in our city and its reputation should impel every citizen to familiarize himself with, and then show his children, the "Davenport inscribed tablets" and the "Davenport elephant pipes." The earliest mention of mounds made on our records was in 1873, when Mr. George H. French stated that there were interesting mounds near Albany, Illinois. Shortly after that the members of the Academy began making their first explorations of mounds, which they continued all over Illinois and Iowa. Captain Hall explored many, and sent the Academy hundreds of the most valuable specimens from Arkansas and Missouri and other Southern States. Copper and stone axes, pipes, beads, arrow and spear-heads; pottery in great variety, and bones in different conditions of preservation—these were the usual relics found, until in 1877-1880 the inscribed tablets and the elephant pipes came to light. Some scientific men hold that when Columbus discovered America he found a country without a history. No Pompeii had existed here, no Athens, no Troy, only wandering tribes of Indians, a people pictured in school histories as roving from place to place, living by hunting and fishing. These Indians built no permanent abodes, none such were discovered, nor were they known to possess the art of writing or a mechanical turn of mind. A camping band of hunters, the men fished, smoked, and followed the chase, the women did the work. Such we have seen them here in Iowa, such have they

ever been reported. On the other hand, the mound builders were a domestic people; they built cities and fortifications in which to defend themselves against a warlike enemy; they made brick, smelted copper, wove cloth, and moulded pottery. They were driven south into Mexico some 1,500 years ago; how long before that they lived here it is hard to tell. Trees have been found growing on top of their mounds which indicated an age of more than 800 years; and the Davenport elephant pipe and the picture of an elephant or mastodon on one of the tablets show accurately that these mound builders knew of such beasts. In 1877 Dr. Farquharson wrote of these tablets: "You need scarcely be told that the recent discovery of engraved tablets of stone in one of the mounds of this vicinity is one of great, even transcendent importance, not only to scientific persons but to the world at large." And again he writes, speaking of one of our tablets: "The last link in the chain of evidence of the coeval life of man and the mastodon on this continent bears the date of 1877, and is to be found on the face of the hunting-scene tablet now before you." In Wisconsin the mound built in the form of an elephant, 135 feet long and 66 feet high, is another link. The elephant pipes are still another link.

The last ten years have seen a wonderful interest developed in the mound builders question. Not only state and federal archæologists have been actively at work, but local scientific institutions and many eminent archæologists on their own account. Hundreds of ancient mounds have been explored in all parts of the United States; a few inscribed tablets, beside the ones we own, have been discovered, but no carving of the elephant other than the two we possess. Prof. J. T. McLean, in his work on the mound builders, says: "In all the mound builders' relics from the valley of the Ohio no trace of the elephant family has been found. The remains of the mastodon have been found in the gravel and other deposits. These animals must have ceased to exist in the United States long before the mound builders began to flourish. Still the mastodon must have existed somewhere. The mound of Wisconsin is no ideal structure. If the report of the Davenport Academy of Sciences is to be accepted, then this effigy is not an isolated case. It states that a member of the association has found a carved pipe in the form of an elephant. This, however, is not incredible, on account of the discovery of the Wisconsin mound. It is evident that in order to have delineated the form of this animal it must have been seen. If, however, the builders of the mound saw the mastodon in the valley of the Ohio or Mississippi, then the mound builders must be assigned an antiquity which other evidences would not warrant."

We possess probably the finest collection of relics of this ancient people in existence, and I believe that these insignificant elephant pipes and unintelligible tablets will some day be appreciated as of more value than any "curiosity" of any kind or nature in this country. Future discoveries will probably disclose the fact that these people lived in these valleys several thousand years ago. Should we not en-

deavor to preserve some of these ancient mounds which should have such deep interest for every American? The ruins of Fort Ancient in Ohio, which is probably the largest yet discovered, being over three miles in length, will fortunately be preserved, the site having been bought by the state.

The work that this Academy has done is marvelous, and I can only urge upon you to continue that work. There is nothing so important to us as a systematic exploration of mounds and graves, and if possible we should carry the work into Missouri and Arkansas. This Academy is known from London to Tokio, from St. Petersburg to Cape Town, and amongst thousands of scientific men all over Europe and America. For example, we correspond or exchange reports of proceedings with historical or scientific societies located as follows: Eleven in Algiers, Cape Town, Cairo and other places in Africa; 16 in South America; 15 in Shanghai, Bombay, Calcutta, Tokio and other cities in Asia; in Australia, 10; Austro-Hungary, 25; Belgium, 20; Denmark, 4; France, 112; Germany, 108; England, 65; Ireland, 8; Scotland, 16; Wales, 1; Greece, 1; Iceland, 2; Italy, 28; Netherlands, 10; Norway, 11; Portugal, 4; Russia, 17; Spain, 6; Sweden, 6; Switzerland, 16; Turkey, 1; Guatemala, 1; San Salvador, 1; Mexico, 5; Havana, 3; Trinidad, 2; Peru, 2; Jamaica, 1; and in the United States and Canada, 130. Davenport, as a city, is known in but a few states. Explain this clearly to our fellow citizens, who have always the greatest pride in our city's name and reputation for wealth and learning; inform and satisfy them that our collections are of world-wide reputation and importance, and not a lot of old rubbish buried with the braves of the retreating Sioux and Fox Indians — do this and the money needed to continue our work will be quickly forthcoming.

#### ELECTION OF OFFICERS — 1893.

*President* — Dr. W. L. ALLEN.

*Vice-President* — EDWARD S. HAMMATT.

*Recording Secretary* — A. W. ELMER.

*Corresponding Secretary* — Prof. W. H. BARRIS.

*Curator* — Prof. W. H. BARRIS.

*Treasurer* — FRANK NADLER.

*Librarian* — C. E. HARRISON.

*Trustees for Three Years* — W. H. BARRIS, GEO. P. MCCLELLAND, A. M. JUDY, and W. C. PUTNAM.

*Trustee to fill vacancy* (made by electing Dr. Allen to the Presidency) — B. F. TILLINGHAST.

G. K. Hoover read a letter from Prof. Clement L. Webster of Charles City, Iowa, proposing to deliver a lecture for the benefit of the Academy at an early date, the Academy to defray his expenses.

The offer was accepted and the matter referred to the entertainment committee to arrange date and details.

The President announced the appointment of standing committees for the year as follows :

*Finance*—W. C. Putnam, C. A. Ficke, H. M. Henley.

*Publication*—Mrs. M. L. D. Putnam, Dr. Jennie McCowen, Prof. S. Calvin, Prof. W. H. Barris, Dr. C. H. Preston, Prof. J. B. Young.

*Museum*—W. H. Pratt, Archæology ; Miss S. G. Foote-Sheldon, Conchology ; Prof. W. H. Hatch, Ichthiology ; Miss J. Sanders, Entomology ; Prof. W. H. Barris, Geology and Palæontology ; Frank Nadler, Mineralogy ; Dr. A. W. Elmer, Natural History ; J. J. Nagel, Botany ; James M. De Armond, Historical Collections.

*Library*—Charles E. Harrison, Louis Block, Rev. A. M. Judy.

*January 27, 1893.*—REGULAR MEETING.

President Allen in the chair ; six members present.

A letter from Mr. W. C. Wyman was read, requesting that a collection of mound builders' relics be sent by the Academy for exhibition at the World's Fair at Chicago ; also a request from Mr. Henry Stearns for the Academy publications for the Fair. The Secretary was instructed to learn particulars as to the latter request, but as to the former it was decided, after some discussion, not to risk the loss of valuable relics in transit.

Mr. C. E. Harrison was appointed to correspond with parties at Toolsboro, Iowa, and Corinth, Kentucky, in regard to obtaining permission for the Academy to open certain promising mounds near those places.

*February 10, 1893.*—TRUSTEES' MEETING.

(Held at the Business Men's Rooms, Masonic Temple).

President Allen in the chair ; eight members present.

The meeting was called to introduce Mr. Becket, who wished to present the entertainment, "*Ben Hur*," in this city, under the auspices and for the benefit of the Academy of Sciences. After a full explanation of the proposal and some discussion thereon the matter was referred for decision to a committee composed of President Allen, C. E. Harrison, Mrs. M. L. D. Putnam, and Dr. A. W. Elmer.

*February 24, 1893.*—REGULAR MEETING.

President Allen in the chair.

The President reported that the Trustees had agreed with the "*Ben Hur*" company for an exhibition, to be given April 12 to 15 inclusive.

*April 28, 1893.*—REGULAR MEETING.

President Allen in the chair ; four members present.

The lecture by Prof. Webster which had been arranged for the March meeting, not having been delivered at that time, was indefinitely postponed.

The Curator reported the receipt of a box of specimens from Dr. S. C. Bowman of Bennett, Iowa, including a Virginia rail, a jack-rabbit, and a small specimen of *mephitis mephitica*.

A letter from Prof. F. Starr was read proposing a continuation of his work on "Iowa Antiquities" by adding to the "Bibliography," already published by the Academy, a "Summary" of what has been written on the subject, and enlisting, so far as possible, by circulars of instruction, etc., the co-operation of new explorers throughout the State. He asked of the Academy only the expense of publication and aid in distributing circulars, and it was decided to authorize him to proceed.

A paper on "Historical Criticism and an Ancient Gem Mine," sent by Prof. E. L. Berthoud of Golden, Colorado, was read and referred to the publication committee.

Mr. George T. Baker was elected to regular membership.

The President reported that the "*Ben Hur*" entertainment had netted the Academy about \$375.

The following resolutions, presented by Mr. C. E. Harrison, were unanimously adopted :

*Resolved*, That the thanks of the Academy are hereby extended to our friends who so ably and cheerfully assisted in presenting the pantomime, "*Ben Hur*," on April 12, 13, 14, and 15, for the benefit of the Academy.

*Resolved*, That a complimentary pass to the Museum for the current year be issued to each of the performers and chaperones.

*July 28, 1893.*—REGULAR MEETING.

The chairman of the publication committee stated that the first half of the index to the first five volumes of the Academy PROCEEDINGS was now printed, and that Prof. McGee donates to the Academy his

many months of labor in preparing the same, for which the society had expected to be at an expense of several hundred dollars. A unanimous vote of thanks was tendered the professor. The thanks of the Academy were also extended to Mrs. C. C. Parry for the engraved portrait of Dr. Parry, donated for the PROCEEDINGS.

*August 25, 1893.*—CALLED MEETING.

President Allen in the chair ; six members present.

Mrs. Putnam for the publication committee reported the distribution of 750 copies of the last volume of the PROCEEDINGS to American correspondents, the foreign copies being ready for shipment. She also reported as delegate to the A. A. A. S. at its late meeting at Madison, Wisconsin.

A motion by Dr. A. W. Elmer to reconsider the action taken as to sending a collection of relics to the World's Fair was lost.

*September 18, 1893.*—SPECIAL MEETING OF TRUSTEES.

The meeting was called to consider the advisability of buying the lot adjoining the Academy lot on the north, consisting of 45 feet fronting on Brady street, and offered at \$25 per front foot. It was voted to make the purchase if approved by vote of the Academy.

Mr. W. C. Putnam of the finance committee stated that he had effected a settlement with the Kuhnen estate on the understanding that Mr. Kuhnen's bequest of \$1,000 be paid and his subscription of \$25 a year be remitted. On motion, this agreement was approved.

A biographical sketch of the late Dr. C. C. Parry, prepared by Dr. C. H. Preston, was read by title and referred to the publication committee.

*September 22, 1893.*—CALLED MEETING.

Held at Harrison's pharmacy ; nine members present.

The following resolution was presented and adopted :

*Resolved*, That the Davenport Academy of Natural Sciences accept the proposition of the executors of the estate of Mrs. Patience Newcomb, deceased, for the purchase of the lot adjoining the present lot of the Academy on the north, and consisting of forty-five (45) feet, more or less, facing on Brady street, for the consideration of twenty-five (\$25) dollars per front foot, and that the trustees or officers of the Academy be authorized to pledge or mortgage the property or securities of the Academy, so far as may be necessary for that purpose, and to execute all necessary papers.

*December 7, 1893.*— CALLED MEETING.

President Allen in the chair ; nine members present.

The meeting was called in memory of Prof. W. H. Pratt, and of Prof. John Tyndall, the former one of the founders and the latter an honorary member of the Academy.

A large framed portrait of Prof. Pratt was set up on the President's table, vividly recalling the features so familiar and endeared to the members and friends of the organization for which he labored so assiduously and so long. A number of short addresses were made by those present, all breathing the same spirit of warm appreciation of Prof. Pratt's self-denying labors in behalf of the Academy.

Mrs. Putnam read extracts from a number of letters received from him since his removal from the city, showing his love for and continued interest in the institution, and his desire for its welfare. The following resolutions were unanimously adopted :

WHEREAS, W. H. Pratt, one of the founders and a lifelong member of this Academy, has been called to rest from his earthly labors ;

*Resolved*, That in his death we recognize the loss of a worker than whom the Academy has known none more disinterested and devoted ; of a friend than whom it has had none more steadfast and true ; of a man, the influence of whose life, spent in the love of and search for truth, will never cease from bearing good fruit.

*Resolved*, That we hereby testify our appreciation of his worth and our sorrow for the loss of one who honored this Association by long service in its most honorable offices.

*Resolved*, That we tender our heartfelt sympathy to the bereaved family, to whom, and to the papers of Davenport and Minneapolis, the Secretary is instructed to transmit copies of these resolutions.

W. H. BARRIS,  
C. E. HARRISON.  
C. H. PRESTON,  
*Committee.*

Mrs. Putnam was requested to prepare a biographical sketch of Prof. Pratt for publication in the PROCEEDINGS.

The committee appointed to prepare resolutions on the death of Prof. Tyndall reported the following, which were on motion adopted :

WHEREAS, It is fitting that an institution devoted to the advancement of science should honor the memory of those who have been eminent in promoting scientific research : and —

WHEREAS, In the death of Prof. John Tyndall the scientific world has lost a worker distinguished among original investigators, and a lecturer on scientific subjects of high reputation and of great usefulness, therefore —

*Resolved*, That the Davenport Academy of Natural Sciences unites with

other scientific associations in offering a sincere tribute of respect to his memory.

*Resolved*, That these resolutions be spread upon the records of the Academy, and that copies of the same be sent to the city press.

JENNIE McCOWEN,  
C. E. HARRISON,  
*Committee.*

*December 29, 1893.*—REGULAR MEETING.

President Allen in the chair: six members present.

The addition to the museum of a number of stone axes and flint arrow-heads, collected by Capt. W. P. Hall, was reported, the Captain himself being present.

A nominating committee for the approaching election of officers was appointed.

The resignation of Mr. B. F. Tillinghast, as trustee, was presented and accepted.

*January 3, 1894.*—ANNUAL MEETING.

President Allen in the chair; ten members present.

RECORDING SECRETARY'S REPORT.

The Recording Secretary begs leave to report as follows:

In addition to the annual meeting January 4, and a memorial meeting December 7, there have been held during the year seven regular and two trustees' meetings with an average attendance of seven.

An entertainment, the "*Ben Hur*" pantomime, was given April 12 to 15.

The regular membership, increased by the election of one, is now sixty-eight.

We have lost by death one life member, W. H. Pratt, and two honorary members, J. H. Murphy and E. H. Pendleton.

The number of visitors to the museum was 540. Respectfully submitted.

A. W. ELMER, *Recording Secretary.*

LIBRARIAN'S REPORT.

MR. PRESIDENT:

The Librarian has the honor to report for the Academy year just closed, additions to the library by exchange and contributions, volumes and parts of volumes to the number of 1,305, about one-third of this number being from foreign societies.

In my report as Librarian, one year ago, I urged the necessity of properly binding many hundreds of valuable books and pamphlets now

on our shelves. I regret to say that, as yet, nothing has been done in that direction. I trust the Academy may find it possible to make an appropriation for this work in the near future. Until such time as the Academy can procure some one to give his entire time to library work, I fear but little progress will be made on the index already begun; owing to press of other work I have been unable to accomplish anything in that direction during the year.

January 3, 1894.

C. E. HARRISON, *Librarian*.

#### REPORT OF THE PUBLICATION COMMITTEE.

In the first presidential address, read before the Academy in 1869, Dr. C. C. Parry recommended the publication of the proceedings. In every succeeding president's address, especially since the issue of Volume I., in 1876, the sentiment has prevailed that the most important work of the Academy, after original investigations and the writing of papers, was publishing them for the benefit of other scientific societies.

Volume I. was an unexpected success, and since then the interest in the publication has never flagged, although circumstances at times have almost suspended active work. From that time—the Centennial year—to this—the Columbian year—five volumes have been published, recording a most interesting story of struggles and triumphs over difficulties, of an enterprise wholly dependent upon the unselfish devotion of a few; supported by subscriptions to volumes, by entertainments and donations. The Publication Committee has seldom had a printer's bill presented without funds provided for paying it.

The most important event in the history of the publication this year is the completion and distribution of Volume V. This labor of distribution, no light task, was performed by Dr. W. H. Barris, occupying a month of arduous work.

Volume V. contains 370 pages, forty-seven wood cuts and illustrations and a portrait of the late Professor D. S. Sheldon; also an index of the entire publication—Volumes I.–V., prepared by J. W. McGee, chief of the United States Ethnological Department, Washington, D. C.

This work of Prof. McGee was a gratuitous donation to the Academy. The clerical work alone, which he has done, is worth \$350.00, which is his donation to the enterprise. The index covers eighty-nine pages and is complete in all its details, gotten up on methods original with Prof. McGee, and much commended by all who have examined it.

Volume V. has been distributed to all scientific societies, both home and foreign, the latter through the courtesy of the Smithsonian Institution, which kindly attends to sending the ACADEMY PROCEEDINGS, if properly addressed, to various foreign societies.

We have already received many acknowledgements from all over the

world, showing the promptness with which the Smithsonian has distributed the books.

The binding of two hundred copies of Volume V. in cloth has been delayed to secure an appropriate design for the die on the cover.

As Volume V. closes the first series of the ACADEMY PROCEEDINGS and contains a number of Dr. Parry's original papers, among them his last one, it seems proper that a flower discovered by and named for him should be represented on the outside cover. So far we have not been able to determine the proper flower.

Another work of your committee is the publication of fifty-two pages of Volume VI., comprising a "Bibliography of Iowa Antiquities," by Prof. Frederick Starr, Ph.D.; "Buddhism in America," by Edward L. Berthoud, and "Ancient Grooved Rocks in Arkansas," by W. A. Chapman (illustrated).

Beside these a very interesting and carefully prepared "Biographical Sketch of the Late Charles C. Parry" has been written by Dr. C. H. Preston, supplemented by a list of the papers published by Dr. Parry, prepared by his wife.

Mrs. Parry has presented two thousand copies of a fine steel plate portrait of Dr. Parry to accompany Volume VI.

Prof. Starr has stated his willingness to prepare a summary of all the matter that has been written on Iowa archeology, if he can have the assurance that the Academy will publish it. Your committee would recommend the assumption of this important work.

It is with grateful remembrance that the chairman of your committee would speak of the zeal and untiring labor of Prof. W. H. Pratt, whose death occurred in Minneapolis on Dec. 4, 1893. He was a member of the first publication committee, and from the inception of the movement threw his enthusiasm into it with an appreciation of its importance contagious to his co-laborers. Ready alike with pencil and pen, the first volumes of the PROCEEDINGS teem with his illustrations and descriptions of mounds and other papers.

The first publication committee consisted of W. H. Pratt, J. D. Putnam, C. H. Preston, R. J. Farquharson and George H. French, of whom Dr. Preston alone remains and is still on the Publication Committee doing most efficient work.

At a memorial meeting of the Academy held in honor of our late lamented friend W. H. Pratt, a committee was appointed to prepare a biographical sketch to appear in Volume VI. of the PROCEEDINGS.

Perhaps an interesting item in connection with the publication is the fact that aside from the returns in valuable donations of curiosities and a library of at least 28,000 volumes, five hundred to one thousand dollars has been realized from the sale of the PROCEEDINGS, which receipts have always been used to continue the publication. For this reason the publication fund has been kept separate from the general fund and has always been in bank on the account of the chairman of your committee.

The total expenditure for 1893 has been \$354.66, distributed as follows:

Preface and Table of Contents, Vol. V.....	\$ 15.00	
Clerical work on Index, Mr. Van Doren.....	48.00	
Judd and Detweiler, on account.....	170.00	
Printing Covers.....	10.00	
Total expense of Vol. V. for '93.....		\$243.00
Volume VI., printing four forms.....	60.00	
Illustrations.....	13.66	
Printing Parry biography.....	38.00	\$111.66
Total expenditure in 1893.....		354.66

## LIABILITIES.

Due Judd & Detwiler.....	\$166.00	
Due Egbert, Fidler & Chambers.....	118.00	\$284.00

Total expenditure on Volume V. to date, \$1,021; balance due, \$284.00; total cost of Volume V., \$1,305.00.

Respectfully submitted,

M. L. D. PUTNAM, *Chairman Publication Committee.*

January 3, 1894.

## TREASURER'S REPORT.

The treasurer's report showed receipts during the year of \$1,993.71, expenditures of \$1,956.72, leaving a cash balance of \$36.99. The expenditures included the payment of the floating debt of the Academy, amounting to \$411. Of the receipts nearly \$400 was derived from the proceeds of the four Ben-Hur performances last April.

In this connection the finance committee reported the purchase of the fifty-foot lot adjoining the Academy property on the north, at a cost of \$1,560. The amount necessary for the purchase was received as follows: From Kuhn estate, \$1,025; Newbold estate, \$80; individual subscriptions, \$165; loan, \$260.

The above amount (\$1,560.00) includes, together with the present purchase of forty-six feet, settlement in full for four feet previously purchased at fifty dollars per foot, with accrued interest on the same.

## ELECTION OF OFFICERS—1894.

*President*—Dr. W. L. ALLEN.

*Vice-President*—EDWARD S. HAMMATT.

*Recording Secretary*—A. W. ELMER.

*Corresponding Secretary*—Prof. W. H. BARRIS.

*Treasurer*—FRANK NADLER.

*Curator*—Prof. W. H. BARRIS.

*Librarian*—C. E. HARRISON.

*Trustees for Three Years*—Mrs. M. L. D. PUTNAM, Dr. JENNIE McCOWEN, C. E. HARRISON, and E. S. HAMMATT.

Standing Committees were announced as follows :

*Finance*—W. C. Putnam, Frank Nadler, H. M. Henley.

*Publication*—Mrs. M. L. D. Putnam, Dr. Jennie McCowen, Prof. S. Calvin, Prof. W. H. Barris, Dr. C. H. Preston.

*Library*—Charles E. Harrison, Dr. Jennie McCowen, E. S. Ham-matt.

A vote of thanks was extended to Mrs. C. C. Parry for the gift of Dr. Parry's portrait for the PROCEEDINGS.

#### PRESIDENT'S ANNUAL ADDRESS.

DR. W. L. ALLEN, January 3, 1894.

#### LADIES AND GENTLEMEN :

The year just passed has been apparently an uneventful one to the Academy. We have made no archæological explorations, have added little of importance to our museums, have had few original essays for our publications, have strengthened our membership by but one new member; nevertheless we have done well financially, and the year 1893, on account of the Columbian Exposition with its beauties and wonders of art and of mechanical skill and ingenuity, and its historical and archæological treasures has so awakened and stimulated the intellect of the people all over the United States, that neither the cares of business nor the struggle for wealth can efface the deep impression made by that wonderful spectacle. This impression will beget an appetite for knowledge, and this desire for intellectual food will bring the people to the store-houses of knowledge, the libraries and academies of science and art. I feel, therefore, that we have the greatest cause for congratulation over the year just passed, for it is bound to bring many new members to us, not that we need their money, for time will bring many endowments, but we do want their intellectual strength and interest. We have just sustained in the death of Professor W. H. Pratt a loss which will be felt by this Academy for many years. Being one of the original four who, twenty-six years ago, founded this Association, he continued to work for it with such constancy and zeal that our publications will ever reflect his good work and stand as a monument to it.

Our Secretary's report shows a decrease in the number of meetings held, but the average attendance about as usual, with the addition of one new member during the year.

The Curator's report gives the usual additions to the museum beside some two hundred stone and flint implements obtained from various parties by that "Ancient Mariner," Captain Hall.

Our Librarian reports that over 1,300 books and pamphlets have been added to our library, which brings the number up to 28,800.

Among these are books of the greatest value and the recent publications of scientific societies all over the world.

Our Treasurer's report is very encouraging:

Receipts.....	\$1,993.71
Expenditures.....	1,956.72

Cash balance.....	\$ 36.99
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This includes the payment of the floating debt, which amounted to \$411. Nearly four hundred dollars of the receipts were derived from the proceeds of the four performances of "Ben Hur," conducted by our friends last April and so liberally patronized by the people of this city.

Our Finance Committee reports the purchase of the fifty-foot lot adjoining our property on the north, at a total cost (including the amount due for the four feet purchased several years ago, and on which no payment was made) of \$1,560. To meet this we received from

Kuhnen Estate.....	\$1,025
Donations by Messrs. Smith, Putnam, and Phelps.....	195
Newbold Estate.....	80
Loan .....	260

\$1,560

There is in the endowment fund the sum of \$1,200 invested in two seven per cent. farm mortgages, one of \$200 and one of \$1,000. There are also the two bequests of \$1,000 each, of the late Mr. and Mrs. J. M. Parker, and an interest as residuary legatee of the Newbold estate, which will bring us about \$500.

Our Publication Committee reports the first part of Volume VI. finished. Volume V. was completed and delivered early in the year at a cost of \$1,300. The committee needs the sum of \$300 to pay for additional copies and binding. All the funds necessary for these publications have been secured, as in the past, by the individual and indefatigable efforts of Mrs. Putnam.

While the actual needs of the Academy are small, yet I hope to see: First — Five thousand dollars expended on our library for binding and publishing a catalogue—this would give us the finest scientific library in the West, and would add many professional men in this vicinity to our membership: Second — The sum of \$20,000 as an endowment to our publications, so that our PROCEEDINGS could be gotten out as soon as desired without requiring personal subscriptions in advance: Third — Twenty thousand dollars to extend our building in order to have room to exhibit our collections, more than half of which are at present either boxed up or so cramped for space as to be overlooked: Fourth — A large endowment for archæological explorations. This Academy was the pioneer in this work in this section of the country, and had we a large fund, the interest of which could be used in sending out members to make explorations, we would draw hundreds of young men to our membership.

Our archæological collection now consists of 350 copper-beads, 14 copper awls, 33 copper axes, 62 mound-builders' pipes, 4 inscribed tablets, 250 vessels of ancient pottery, also of Indian relics, 1,100 stone implements and 15,000 flint—principally arrow and spear-heads. In evidence of the value of this part of our collection, not as specimens in a museum, but as proofs in the study of the history of mankind, as guide-posts in the search for truth regarding the earliest inhabitants of this country, I need only call your attention to the original essays of Dr. Farquharson, Prof. Seyffarth and Mr. Putnam, found in our own proceedings.

Dr. Farquharson wrote in 1875 concerning our copper axes, and the article attracted wide attention. At that time there were but eleven copper axes besides the twenty-five we had in our collection, known or reported in this country. Did the mound-builders possessing copper axes belong to the copper period corresponding to the same period in Europe? As these axes were covered with cloth, did they not make cloth? If not, where did they get their copper axes, and who made them?

Concerning the inscribed tablets found in 1877 on the Cook farm below Davenport, Prof. Seyffarth writes: "They are the first discovered phonetic and astronomic monuments of the primitive inhabitants of this country which sooner or later will cast unexpected light upon the origin, the history, the religion, the language, the science and intellectual faculties of our ancient Indians." Further on he says: "The Northmen, it is true, discovered America prior to Columbus, but the Indian characters on the Davenport monuments point us clearly to the Chinese syllabic figures and not to the alphabetic runes." Again, speaking of the third tablet, he says: "This is, no doubt, the most interesting and most important tablet ever discovered in North America."

These essays, with that of Mr. Putnam, bring out strongly the different views of archæologists as to the origin of the mound-builders and their great antiquity. Prof. Seyffarth claims that one of these tablets is a memorial of the Noachian deluge, while other eminent scientists translate it as a hunting scene, and believe its great value is due to the representation of an elephant thereon. When we consider that there are at present but few inscribed tablets in this country, and that we have the largest and most complete collection of curved-base pipes and copper implements, it ought to stimulate the society to devote most of its time and work to this particular branch of archæological research.

*February 19, 1894.*—TRUSTEES' MEETING.

(Held at the Rooms of the Business Men's Association, Masonic Temple.)

President Allen in the chair; six members present.

The meeting was called to consider a proposition from Mr. D.

Cheeny to give a musical entertainment at an early date for the benefit of the Academy. Mr. Cheeny, being present, described in brief the sacred Cantata, "*Egypta*," which he desired to present, showing photographs of costumes, etc.

After some discussion the matter was referred to a committee consisting of W. C. Putnam, Edward S. Hammatt, and C. E. Harrison, with power to act.

*February 23, 1894.*—REGULAR MEETING.

President Allen in the chair; six members present.

The Curator reported the donation of a number of stone and flint implements collected by Capt. W. P. Hall.

Mr. Edward Borchardt and Dr. A. Behr were elected to regular membership.

The resignation of Mr. S. F. Smith as Trustee was presented and accepted, and Mr. C. A. Ficke was elected to fill the vacancy thus caused.

The Entertainment Committee reported the acceptance of the operetta "*Egypta*," its presentation to be deferred until May.

It was announced that the executor of the estate of Edward Newbold, a resident of Scott county who died a year or more ago making the Academy of Sciences his residuary legatee, has paid over the sum of \$400, and that a further sum may be realized before the estate is closed.

A paper by Mr. John M. Helmick on a "Serpent Mound," discovered by the author in South Dakota, was read and referred to the Publication Committee (See p. 150).

Mr. Benjamin R. Putnam read a very interesting paper on the iron and copper ores of Mount Hope, New York, and of the Lake Superior region; illustrating the subject by specimens which he presented to the Academy, accompanied by the following descriptive notes:

NOTES ON SPECIMENS OF ORES PRESENTED BY B. R. PUTNAM TO THE  
DAVENPORT ACADEMY OF NATURAL SCIENCES.

DESCRIBED ACCORDING TO LOCALITIES.

MOUNT HOPE, N. J.

*Magnetite*— $Fe_3 O_4$ —from the mines of the Mount Hope Mining Company.

Iron deposits of Northern New Jersey are nearly all lenticular beds of magnetite occurring in archaean gneiss and rarely in crystalline lime-

stone, and having a north-easterly strike, a small dip one way or the other, and pitching along the strike. At Mount Hope there are five nearly parallel beds in hard gneiss, but only two are of much importance. The ore averages between 50 and 55 per cent iron, is hard and uniform, but is mostly non-Bessemer owing to the presence of apatite. The specimen is a fair average of the ore hoisted.

FRANKLIN FURNACE, N. J.

*Franklinite*— $(Fe\ Zn\ Mn)\ O$ ,  $(Fe\ Mn)_2\ O_3$ —variable.

*Willemite*— $2Zn\ O$ ,  $Si\ O_2$ .

*Zincite*— $Zn\ O$ .

Three specimens, showing different combinations of the above minerals. At Mine Hill, where the specimens were collected, the ore bodies consist of two converging, nearly vertical beds or veins, in white crystalline limestone overlying the archæan gneiss. The ore consists of varying proportions of the above minerals in a calcite gangue, the specimen being richer than the average. It is first treated for zinc, and the residue smelted for spiegeleisen. The region is very rich in minerals and is remarkable as being the only place in the world where the above minerals are of anything like economic importance.

HAZELTON, PENN.

Two coal plants and specimen of pyrites from the anthracite colliery of Coxe Bros. & Co., at Oneida.

ISHPEMING, MICH.

*Hematite*— $Fe_2\ O_3$ .

Three specimens. Iron is found around Lake Superior in five ranges or districts—Marquette, Menominee, Penoque-Gogebic, Vermilion Lake, and Mesaba—all of which have many characteristics in common. Ishpeming is in the Marquette district. This is a very disturbed region, and the geology and origin of the ore bodies have been a subject of controversy. The ore is almost entirely hematite, but is either soft and red or hard and specular, and occurs in various shapes but commonly has a trough or basin shape. The geological section is usually diorite, soapstone or jasper, ore, chert, quartzite.

First specimen, "hard ore," or specular hematite, from the Lake Superior Hard Ore mine.

Second. Same from the Lake Superior Hematite mine.

Third. Soft, red hematite from the Lake Superior Hematite mine.

The first and third are average ores.

KEWEENAW POINT, MICHIGAN.

*Specimen of Copper Ore.*

The copper in this region is entirely native—remarkably few copper minerals being found. The copper-bearing horizon consists of layers of igneous rocks and conglomerate beds dipping to the North-

west under the lake at angles varying from 30° to 60°. Only certain of these beds are copper-bearing. According to the character of the deposits they may be classified as follows:

1. Conglomerate beds. The copper occurs as cement and partially replaces pebbles. Examples. Calumet and Hecla, Tamarack.
2. Amygdaloid mines. Copper filling small blow-holes in upper portion of igneous sheet. Example. Atlantic, Osceola.
3. Irregular masses, often of large size, of copper in true veins at right angles to bedding of strata, with a gangue of calcite, epidote, etc. Example. Copper Falls.

The first two are of the most importance. Some of the amygdaloid mines furnish a great deal of "mass" copper besides the ordinary "stamp rock." All the ore, except the masses, is broken by Blake crushers, then crushed by enormous steam stamps, and the copper concentrated on jigs, tables, etc., to about 80 per cent. The concentrated mineral and pieces of mass copper are then melted down and refined in reverberatory furnaces, and cast into ingots of unrivaled purity.

The specimens are as follows:

*Amygdaloid Ore*, from the Atlantic and Osceola mines. Native copper in melaphyr gangue. Average of Atlantic ore is .66 per cent. copper, and of Osceola 1½ per cent.

*Trap*, hanging wall of Atlantic mine.

*Sheet Copper*, Osceola mine.

*Shot Copper*, Osceola mine.

*Native Copper*, Osceola mine.

*Conglomerate*, two specimens, coarse and fine, from the Tamarack mine. This mine is working the same vein as the Calumet and Hecla.

February 23, 1894.

BENJAMIN R. PUTNAM.

#### *June 29, 1894* — REGULAR MEETING.

President Allen in the chair; six members present.

The Curator reported the receipt of a number of mounted ornithological specimens from Dr. S. Bowman of Bennett, Iowa; also from Mr. G. H. Hinrichs of this city, a post or log of wood bored by teredos and thickly covered with barnacles. This specimen was obtained by Mr. Hinrichs during a recent visit to Florida.

The following resolutions of respect were presented and adopted:

*Resolved*, That in the death of Rev. S. S. Hunting, which occurred at Des Moines, June 2, 1894, this Academy has sustained the loss of an honored life member and former president, and of a co-worker whose energy and enthusiasm were ever helpful and inspiring throughout the time of his resident membership. In him the world has lost a true man — honest, fearless, strong; one who did his duty and sought the light, untrammelled by prejudice or tradition. We honor him for the invaluable example of a life

thus spent, and for his unselfish devotion to humanity, not alone in the work of his chosen calling but also in the cause of abolition, of education, of temperance, and of prison reform.

*Resolved*, That we extend to the family our deep sympathy in their loss, and that copies of these resolutions be transmitted to them and to the press of Davenport and Des Moines.

C. H. PRESTON,  
C. E. HARRISON,  
ARTHUR M. JUDY,  
*Committee.*

Prof. J. H. Udden of Augustana College, Rock Island, was elected to regular membership.

*September 28, 1894* — REGULAR MEETING.

W. H. Barris, President *pro tem*.

Capt. W. P. Hall presented to the Academy one copper axe and ten stone axes, with one hundred and twenty-one flint implements and a discoidal stone, all collected by himself for the museum. There had been no other additions since the June meeting. The number of paying visitors in the past three months was one hundred and twenty.

*October 26, 1894* — REGULAR MEETING.

Vice-President Hammatt in the chair; four members present.

The Curator reported the reception from Dr. S. C. Bowman of several valuable donations — birds, fish, Indian relics, etc.

A vote of thanks was extended to the many friends of the Academy who contributed to the success of the operetta, "Egypta," recently rendered under its auspices.

*January 2, 1895* — ANNUAL MEETING.

President Allen in the chair; ten members present.

TREASURER'S REPORT.

Treasurer Nadler in his report stated that the Academy was free from debt, with \$127.93 in the treasury, exclusive of \$36.00 in the hands of the publication committee.

CORRESPONDING SECRETARY'S REPORT.

Your Corresponding Secretary respectfully reports: The number of letters received during the year 1894 is 83, and the number written 168.

These letters embrace a variety of topics, many having no other

than a mere passing, individual interest. Among these are questions as to the determination of mounds, the identification of fossils, the sale of mound relics, the locality and means of obtaining them, proffers of work in such directions as the Academy may need, the books needed in our work, etc.

Many are of an entirely different character, having reference to the Publications of the Academy. For these, applications come to us from colleges, from universities, from societies of natural history and from organizations having scarce one object in common with us.

Many letters come from abroad, and from some of the most prominent foreign institutions of learning, recounting the number of volumes they have received for their publications, directing attention to the fact that certain numbers are missing, trusting the Academy will kindly supply the volumes needed to complete the series, and stating that if we find any of their reports missing they will be most happy to reciprocate the favor.

Thus emphasis comes from all quarters showing the interest taken in our publications and the estimation in which they are held by those best qualified to judge of them.

I need scarcely say, in reference to all letters written or received by the Corresponding Secretary, that they are recorded, with date of reception (or writing), in a book of registry kept for the purpose. The present Secretary has thought best, with each entry and date, to give in few words the subject matter of the letter, so that instead of being necessitated to overhaul a whole year's package, we may at once find, under proper date in the register, the subject matter of each letter written or received, thus reducing labor and facilitating inquiry.

January 2, 1895.

W. H. BARRIS, *Corresponding Secretary*.

#### LIBRARIAN'S REPORT.

##### TO THE OFFICERS AND MEMBERS OF THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

Your Librarian begs to report additions to the library for the year just closed, as follows: January, 100; February, 126; March, 116; April, 126; May, 138; June, 112; July, 118; August, 105; September, 105; October, 97; November, 111; December, 120; total, 1,374.

I desire to renew my plea of a year ago for more shelf-room and better means of properly caring for our rapidly increasing and valuable library. There has been no expenditure during the year for either shelving or binding, both of which are urgently needed and must be had before the Library can be made available for use or study.

Respectfully submitted.

C. E. HARRISON, *Librarian*.

January 2, 1895.

#### CURATOR'S REPORT.

The Curator respectfully reports that one of the By-laws of the

Academy distinctly defines his duty to keep a record of all donations made to the Museum and report all additions at the annual meeting.

It will be seen that the additions made to the cabinet during the past year compare very favorably with those of preceding years.

With the advent of the year we naturally expect to find among the earliest contributors the name of Captain W. P. Hall. It would be a tedious duty to give in detail the different collections he has brought to the Academy the past year. To summarize them we may note that the number of flint implements of every conceivable form, color, and variety of finish is over 250; there are over thirty stone axes, large and small, one copper axe and several discoidal and hammer-stones.

Captain Hall has not only worked himself but influenced others to aid him in his work, to whom, as well as to himself, acknowledgments have been made. In one such collection, presented by John C. Vogel, was the horn of an extinct ox—not a common find, especially this far north.

Mr. B. R. Putnam presented for the Museum a very choice collection of minerals, which he described in a paper read before the Academy. It comprises *magnetite*, *Franklinite*, *mellenite*, *zincite*, *pyrites*, *hematite* in the massive state (specular), and the soft, red species (amygdaloid), with copper in the native state, also as shot and in sheet. This is a model collection, with carefully noted locality and description, making it a most desirable addition to the cabinet.

There was left in the Academy a pair of leather gloves one of which had been through the fire, the heat reducing it in size so regularly and gradually as to preserve its true proportions though with less than half the size of its companion. While not a purely scientific relic, yet, as a freak of nature that could scarcely ever be repeated, it is worthy a place on our shelves.

Through the kind offices of Mr. G. H. Hinrichs the Academy received from Florida a long post of wood somewhat resembling cedar, which had stood, nearly submerged in mud and water, not only perforated through and through by the action of a borer but in addition having its entire surface literally covered with barnacles.

In May the Academy received from Dr. S. C. Bowman of Bennett, Iowa, to whom we are indebted for so many favors, two mounted birds—one a fine, large, well-preserved great blue heron, and one equally well preserved, rarer form, the night heron.

Another consignment came from the Doctor in October bearing witness to his breadth of study as a naturalist. In the department of archæology we have the spine of a conch from the shell heaps of Florida, with peculiar forms of sinkers and plummets from the same beds. In ornithology are the Massina partridge of Texas and five humming-birds in a glass case. In ichthyology is a single specimen of the trunk-fish of Southern Florida. In mineralogy fine specimens of selenite and common salt. In comparative anatomy a skeleton of the red-tailed hawk; head of an old coyote from Inland, Cedar county; head of a young coyote which died in captivity, as the doctor states,

during eruption of permanent teeth. Of Indian relics there are arrows, perforators, and axes from New Mexico, Yucatan, and Andalusia, Illinois; a complete outfit of an Indian brave—bow, arrows, and gun—accompanied by a history of the owner, with his apparatus for kindling fire, also bow-string and iron-tipped arrows from the plains of Texas.

H. S. Wagner of this city has added to our oölogical collection the egg of his African parrot (*Psittacus erythacus*, Lin.), only two of which, he states, were ever laid on this continent, hence he thought it might prove a desirable acquisition to the Academy.

During the past week a visitor asked whether we would be pleased to have the head and attached horns of the buffalo, proposing to spare us two specimens. The next day they were found at the door, evidently one old head and one younger, in a good state of preservation.

As I said in commencing this report, the additions made to the museum compare very favorably with those of preceding years: there is scarcely a department of Natural History not to some extent represented. This holds good in geology, mineralogy, archæology, ornithology, oölogy. Even in the matter of Indian relics and remains, we could not part with any trusting to find its duplicate.

January 2, 1895.

W. H. BARRIS, *Curator*.

#### REPORT OF THE PUBLICATION COMMITTEE.

Your committee would report that the publication of Volume V. and Part I. of Volume VI. has brought many most interesting and valuable publications in exchange from scientific societies, and proved to the world at large that the Academy is a live institution.

The indebtedness of the publication at the end of last year was \$284.00. This has been paid by funds raised at the entertainments given and by subscriptions to Volume VI., and there is a balance in bank of \$36.00.

Professor Frederick Starr of the Chicago University has prepared a "Summary of Iowa Archæology" which will be included in Volume VI., to be published in the near future.

The recommendation of your President last year, for an endowment of \$20,000 for a publication fund has not, so far, elicited a response. In these days when thousands change hands as Christmas gifts, will not some friend of the Academy remember that thus placing the publication of the Davenport Academy of Natural Sciences on a sure footing is to perpetuate the good name and fame of the City of Davenport and build up a scientific library that is already superior to many others in the United States?

M. L. D. PUTNAM,

*Chairman Publication Committee.*

January 2, 1895.

#### ELECTION OF OFFICERS.

*President*—EDWARD S. HAMMATT.

*Vice-President*—C. H. PRESTON.

*Recording Secretary* — A. W. ELMER.

*Corresponding Secretary* — W. H. BARRIS.

*Treasurer* — FRANK NADLER.

*Curator* — W. H. BARRIS.

*Librarian* — C. E. HARRISON.

*Trustees for Three Years* — W. L. ALLEN, C. A. FICKE, C. H. PRESTON, J. B. PHELPS.

*Trustee to fill vacancy* (caused by the election of E. S. Hammatt to the Presidency) — J. H. HARRISON.

Dr. Clarence B. Moore of Philadelphia was elected an honorary member.

PRESIDENT'S ANNUAL ADDRESS.

[President Allen, after reviewing the work of the Academy during the past year and strongly urging the need for more workers and for means to increase the availability and consequent usefulness of the Library and the Museum, took up a detailed consideration of Prof. Thomas' article in the last report of the Bureau of Ethnology on the Davenport tablets and elephant pipes. As this matter was ably and fully discussed by Mr. C. E. Putnam in Volume IV. of the PROCEEDINGS, it is not thought necessary to publish the address in full.—PUB. COM.]

*January 4, 1895.*—TRUSTEES' MEETING.

President Hammatt in the chair; trustees present, Edward S. Hammatt, C. A. Ficke, W. H. Barris, W. C. Putnam, Mrs. M. L. D. Putnam, Frank Nadler, C. E. Harrison, and J. H. Harrison.

Due notice having been given, it was on motion unanimously resolved to amend Section 2 of Article III. of the Constitution and of the Articles of Incorporation (which section defines a quorum of trustees) by striking out the words "a majority" in the fifth line and inserting in lieu thereof the word "five."

It was also voted that the sum of \$50 be placed at the disposal of the Library Committee.

*February 22, 1895.*—REGULAR MEETING.

President Hammatt in the chair.

The action of the trustees changing the number necessary to constitute a quorum of trustees from eight to five was reported, and on motion approved unanimously.

Messrs. Edward S. Hammatt and C. E. Harrison, appointed at a former meeting to suggest a design for a corporate seal, submitted

sketches and estimates of cost. The design representing a female filling the lamp of science, surrounded by the legend "Davenport Academy of Natural Sciences. Incorporated MDCCCLXVIII." the whole in a circle 4.5 cm. in diameter, was adopted.

Dr. Adella R. Nichol was elected to regular membership.

*April 26, 1895.*—REGULAR MEETING.

President Hammatt in the chair; four members present.

The Curator reported the receipt of aboriginal relics from Florida, donated by Clarence B. Moore; also of some beautiful specimens of corals and shells, in glass cases, donated by Mrs. W. C. Wadsworth.

Fred P. Bemis and Dr. Joseph A. Daniel were elected to regular membership.

*May 31, 1895.*—REGULAR MEETING.

President Hammatt in the chair; eight members present.

Mrs. Putnam reported the receipt of a bequest to the Academy of \$10,000, which would become available in about a year.

The Curator reported the receipt from Dr. S. C. Bowman of several boxes containing many interesting additions to the Museum. A vote of thanks was extended to the doctor for his valuable donations.

Charles E. Sheriff was elected to regular membership.

Professor Frederick Starr, being present, spoke at some length on the subject of "Archæological Research." The same evening Prof. Starr delivered a lecture at the First Presbyterian Church on the subject, "Whence Came the North American Indian?" Those who attended were greatly interested in the professor's presentation of the subject. He first gave a description of the Indians of the far Northwest from Vancouver's Island to Sitka, and to the north of that place. He stated that while the tribes, of which there are a great many, resemble each other in what they eat and wear, in their general manner of living, and in their physical characteristics, they have seven totally different languages—as dissimilar as are the French and German, or the German and Finnish of Europe, which whole continent has but four different language stocks. Their stories, too, are entirely different. In the north they all center about the raven as the great power which has figured most conspicuously in their ancient or mythical history; further south the mink is the special object about which their songs are sung, while in the southern tribes nothing is heard of the

raven or the mink ; but the sun and the moon, as sister and brother or as husband and wife, are the great themes of the story-tellers. In the northernmost portions the tribes are nature worshipers. They worship the trees and the mountains. The more central tribes worship the sky, while those near Vancouver worship the sun. Major Powell states that there are fifty-eight language stocks among the Indians of North America without counting those of Mexico or Central America. The Pueblos have a language not in the least similar to that of the Sioux, and wherever some dialect of the Sioux is spoken there will be found the "sun dance." The savages fast for four days, and then putting skewers through the muscles of their chests attach thongs to them. The other ends are fastened to a post, and the Indian, facing the sun in the morning, leans back with his whole weight; and keeping his face toward the sun as the day passes, endures till the skewers tear out of the flesh. The question, "Whence came these tribes, so different and yet so alike?" has been answered by various people in various ways. One theory is that they originated in this country—that they "evolved." There are no fossil remains to support the theory. Another is that they all came from one place—from Egypt, or from Japan, or from Russia, or from the North of Europe—and afterwards became diversified in speech and worship. A favorite supposition is that they are the "lost tribes" of Israel. A third theory is that they are from different places and have slowly acquired similarity in feature and habit. The professor ventured the proposition that as time goes on the people of this country will again acquire common characteristics of features and complexion.

*June 28, 1895.*—REGULAR MEETING.

President Hammatt in the chair ; nine members present.

On behalf of the publication committee Mrs. Putnam presented a proof of the following circular prepared under the direction of Prof. Starr for the enlistment of workers in archæological research :

CIRCULAR OF SUGGESTION REGARDING WORK IN ARCHÆOLOGY.

The Davenport Academy of Natural Sciences desires to organize a systematic and thorough field-work in Archæology through the State of Iowa. As a result of such work the Academy hopes ultimately to publish a final report upon the archæology of the State. This report should accurately locate and properly describe all the mounds, earthworks, village sites, shell-heaps, and other monuments of the aboriginal inhabitants of Iowa ; it should

contain a satisfactory archæological map ; it should describe and figure all types of relics found within the State. It is evident that such a work, if complete and accurate, would be of great value ; it is equally evident that it lies beyond the power of any single worker. The Academy asks the co-operation of Iowa workers everywhere in collecting the material necessary. A minimum space of five years should be devoted to this part of the work. All who are interested are asked to assist. In the report due credit will be given to all faithful helpers. The following suggestions may show what information is needed and how work should be done :

1. Where are there mounds, earthworks, shell-heaps, village sites, rock-shelters, aboriginal workshops, quarries, cliff carvings or paintings ? *Exact* location of such is very desirable. Local maps with position of such sites accurately marked upon them are requested.

2. Groups of mounds should be carefully surveyed and plotted. The plottings should show the location, relative positions, form and size of all the mounds in the group, and their relation to surrounding topography. Earthworks or individual monuments of peculiar character should also be surveyed and carefully plotted.

3. No mound should be excavated until it has been properly surveyed, plotted, and described. Proper excavation is slow and careful work. The best method destroys the mound, but gives absolute knowledge of construction and contents. It consists in removing the whole tumulus, slice by slice. First, a trench is dug, tangent to the mound ; this trench, at its middle point, touches the mound ; it should be a little longer than the greatest diameter of the mound, and should be carried to a depth of a foot or two below the natural surrounding surface. Then a slice of the mound adjacent to this trench is removed ; this slice should be one or two feet wide, and should be carried down to the depth of the trench itself. Afterwards slice after slice is removed. The earth of these slices should be examined with great care as removed. Every object found should be at once numbered, and a note made of its exact position. There should be no haste about this ; all necessary time should be given. If skeletons are found they should be carefully uncovered, and, if accompanied by articles of any interest, should be photographed as they lie, before they are disturbed. When first uncovered, bones are apt to be fragile and soft ; if an attempt is made to remove them at once they are likely to be broken ; they should be allowed to dry, not too rapidly, for a little time, when they can be carefully taken out. Skulls, skeletons and bones are often as important as relics of human handiwork, and should be always preserved. Exact note of location and position of these remains should be made, and all the bones of a single skeleton should be kept together by placing them in a separate sack or package ; this should be carefully labeled to prevent any confusion or uncertainty. All mound material, relics and remains, gains in importance with exactness of knowledge regarding source. Details of mound structure are important, and should be both description and measurements. After a mound has been properly excavated, it should be possible to reconstruct it with every article from it exactly placed, by reference to the notes made. In cases where

slicing is impracticable, two trenches should be run across the mound, intersecting at the centre, and carried to some distance below the original surface on which the mound was built. These trenches should be two or three feet wide.

4. Earthworks other than mounds should be trenched across to show their construction ; the section should be carefully examined, marked, and described ; the trench should be refilled to preserve the original form of the work, and its position should be indicated on the plot and in the notes.

5. Shell-heaps should be carefully cut across and picked to pieces along the exposed section ; a diagram showing stratification of the heap, relations of the shells to underlying and overlying deposits included, and the thickness of the layers should be drawn ; the relation of the heap to topography and water-courses should be described and the form and area of the heap should be determined. Collections should be made of all species of shells and bones contained therein ; also of relics of human remains. The position of each object found should be exactly noted.

6. Village sites should be studied ; the evidence for their being such, stated ; the area should be determined, and a plot made, upon which the location of old homes or hearths should be marked, if possible. All relics found, however crude and imperfect, should be preserved, and a list and tabulation of them made.

7. Rock-shelters or caverns in cliffs have often been used as homes. If such are found they should be carefully described, with their surroundings. Evidence of construction or artificial modification of the retreat should be noted. The walls should be examined for carvings or paintings. The floors should be carefully excavated. The objects found should be located and dealt with the same as mound finds. Diagrams, sections, drawings and photographs should be made of interesting points.

8. Look for aboriginal workshops or factory sites. What was made ? What relation does the site bear to any source of supply of material ? Collect broken and rejected objects, raw materials, tools and implements. Make full notes.

9. Seek for aboriginal quarries or diggings for materials. Collect data like last. Carefully describe, photograph, measure, and diagram.

10. Search after carvings or paintings on cliffs, cavern walls, or boulders. Carefully make tracings of such in natural size and original colors, or make rubbings of them. Photograph the designs in such a way as to show their relations to surroundings.

11. Occasionally caches or "deposits" are found. These are groups or clusters of objects intentionally buried in the earth. Describe such. Where were the objects found ? At what depth ? How were they placed ? What is their number ? Were all of one type ? Describe the specimens -- forms, material, size, grade of workmanship. Draw each type. Such caches should be kept entire and not divided or scattered.

12. Where are there archaeological collections of Iowa specimens, public

or private? Are they of utility and accessible to public study? Give some idea of character and importance.

13. Have you a collection? If so, will you kindly send notes regarding it? Descriptions and outline drawings of choice specimens in your possession are solicited.

14. Have notes or articles on Iowa archæology appeared in your local papers? If so, can you send exact titles and dates? Can you send copy? Can you loan copy, to be returned?

The Academy solicits help in these various directions. It cannot promise to undertake expensive field exploration, but it desires to know what is doing and to help by direction and otherwise. Although possessing an important and valuable collection of specimens, it is less anxious to secure relics than to help to stimulate good work. Correspondence is solicited. Data covering points above indicated will be carefully preserved, and when published credit will be given to collaborators.

The Academy has recently published a *Summary of Iowa Archæology*, by Prof. Frederick Starr, Ph. D., of the University of Chicago. It presents in a condensed form what has so far been done by workers, and gives a needed foundation to students. It may be purchased from the Academy for a nominal sum — 50 cents.

All correspondence in this matter should be sent to

DIRECTOR OF ARCHÆOLOGICAL STUDY,  
*Davenport Academy of Natural Sciences.*

It was voted to print one thousand copies of the circular, as read, for distribution throughout the state; and Prof. Starr was on motion appointed to represent the Academy at the *Congress International des Americanistes* to be held in the City of Mexico in September.

M. N. Richardson and W. McClelland were elected regular members.

The thanks of the Academy were extended to Mr. F. L. Bills, florist, for his very acceptable gift of flowering plants to ornament the Academy grounds.

Mr. M. S. Miller, Prof. Starr's assistant at the Chicago University, spoke by request on the archæological work being done at that institution.

*July 26, 1895* — REGULAR MEETING.

President Hammatt in the chair; five members present. Only routine business.

*September 11, 1895.* — REGULAR MEETING.

(Adjourned from August 29.)

President Hammatt in the chair; seven members present.

Miss Emma A. Rice, Dr. C. R. Baker, F. J. Walz and Edward C. Roberts were elected regular members.

*September 27, 1895* — REGULAR MEETING.

President Hammatt in the chair ; five members present.

The Curator reported the removal of the mineral collections from the library room above to the south front room below, thus making additional shelf room for books, amounting to five hundred feet.

Dr. Edward Gudeman and M. Spelletich were elected regular members.

A committee was appointed to prepare resolutions on the death of Prof. C. V. Riley.

*October 24, 1895* — ADJOURNED MEETING.

President Hammatt in the chair ; nine members present.

Further additions to the museum from Dr. S. C. Bowman, now of Andalusia, Ill., were reported by the Curator.

The Librarian reported progress in the re-arrangement and classification of the library.

A report was read from Prof. Frederick Starr of his recent visit to the City of Mexico to attend the *Congress International des Americanistes*. Being unable to remain for the congress as the date of meeting had been postponed, he had left a paper descriptive of the work of the Davenport Academy.

The following biographical sketch of the late Prof. C. V. Riley, prepared by Prof. H. F. Wickham of the Iowa State University, was presented by Mrs. M. L. D. Putnam. Prof. Riley was an honorary member of the Academy and much interested in its welfare:

CHARLES VALENTINE RILEY, A. M., PH. D.

Though the fame of Dr. Riley rests chiefly on work done in this country, he was by birth and early training a foreigner, having been born in England in 1843. His early education was received in Great Britain and on the continent where he acquired that familiarity with the French and German languages which proved of so much value in his later investigations. At about his seventeenth year he came to America, where, after spending a few years on an Illinois farm, he became a member of the journalistic force of a Chicago paper and, by his writings therein on economic entomology, laid the foundation of the high regard in which he is everywhere held.

His first official work seems to have been in the capacity of state

entomologist of Missouri. He was appointed to this place when about twenty-five and held it for nine years. The annual reports covering this period contain a great mass of practical and scientific information and show the most acute power of observation combined with a quick appreciation of what would be of real value to the agriculturist. This latter characteristic of Dr. Riley must be due in no small part to his actual experience as a farmer. His ability as an artist is shown in the illustrations of these reports, for he furnished his own drawings. Some of these figures are to be found to-day in almost every American work on economic entomology published since they appeared. The nine volumes still form an essential part of the library of every worker on the life-histories or economic importance of insects.

With the formation of the United States Entomological Commission, Dr. Riley was placed at the head of that body which carried on researches into the habits of and methods of combatting some of the greatest insect plagues with which man has had to struggle. Five extensive and valuable reports have been published, the first, for 1877, treating of the Rocky Mountain locust; the second, following two years later, with an additional account of the same scourge. The third relates some further observations of the locust and contains also important treatises on several other pests. The fourth is occupied by a careful treatment of the cotton and boll worms, while the fifth deals with the insect enemies of forest and shade trees. A number of bulletins were also issued by the commission.

Dr. Riley also edited, in connection with Prof. B. D. Walsh and Dr. George Vasey, the *American Entomologist*, which, after two years of usefulness, was allowed to drop for a decade, but was revived in 1880 for another volume, after which it was discontinued. Here, as elsewhere, the practical side of the study of insects received the chief share of attention.

His connection with the entomological commission did not hinder Dr. Riley in the acceptance of new responsibilities and the performance of other duties. Leaving his Missouri position he accepted, in 1876, the post of entomologist to the United States Department of Agriculture; and the report for that year is from his pen, though he shortly resigned the place. Three years later the Division of Entomology was created with Dr. Riley at the head, and this has given to the public each year a report of the principal pests observed, and in addition has published a series of thirty-two bulletins on various subjects connected with insect injuries, besides a number of separate papers and several volumes of *Insect Life*—the whole forming an almost perfect history of the advance of economic entomology during these years.

One of his achievements which has attracted a great deal of public attention and has been productive of great good, is the introduction into this country of the native Australian enemies of the "Fluted Scale" or *Icerya*, which at one time threatened the very existence of the orange industry in California. As early as 1886 Dr. Riley became convinced of the advisability of the importation of the parasites of the

scale and, after much trouble, succeeded in finding the means to send an investigator to study and collect them. By careful attention and judicious distribution whole districts were rendered nearly free from the pest, and a means shown to be open for keeping it under control.

In 1894, on account of failing health, he severed his connection with the division, but retained that of Honorary Curator of Insects in the National Museum. This post had been given him some years before, and in consequence of the necessary provisions being made for its care and preservation, he made over to the museum his entire private collection, containing about 18,000 species, represented by over 115,000 specimens in all orders of insects. He had expected to devote his remaining years to the study of pure science, and all the world must regret that his plans were cut short by the accident which terminated his life. On the 14th of September, while on the way to the City of Washington from his home on Columbia Heights, his bicycle struck a stone lying on the concrete and Dr. Riley was thrown from it head-foremost, striking the pavement with such force as to fracture the skull. Though given the best of medical care his death followed early the following morning — September 15th.

H. F. WICKHAM.

Messrs. M. Bunker, C. A. Mast, and Ira R. Tabor were elected regular members.

Mr. C. E. Harrison called attention to the fact that in a paper by W. R. Hoffman, published in the *Modern Illustrator and Home Journal* for October, 1895, entitled "Pottery of the American Indians," a number of specimens in the Museum of this Academy were accredited to the National Museum at Washington. The Corresponding Secretary was instructed to direct the attention of the editor to the mistake.

*November 21, 1895.*—TRUSTEES' MEETING.

President Hammatt in the chair; six members present.

It was voted to put a new furnace in the Academy building.

*November 29, 1895.*—REGULAR MEETING.

A paper by Prof. H. F. Wickham of Iowa City on "Some Species of Coleoptera from the Southern Shore of Lake Superior;" and a paper by Prof. Jerome McNeill of the University of Arkansas entitled "A Revision of the *Truxalinæ* of North America," were presented and referred to the publication committee.

*December 27, 1895.*—REGULAR MEETING.

President Hammatt in the chair; five members present.

The Curator reported the addition to the Museum of over 400 flint implements and a number of stone axes, collected by Capt. W. P. Hall. The donation from Mrs. C. C. Parry of a Pino Indian blanket, from native cotton, made by hand, was also reported.

Sixty-two new species of orthoptera, representing the work and study of years and accompanying a fully illustrated paper describing them, which will appear in the forthcoming Volume VI. of the Academy PROCEEDINGS, were presented by Prof. Jerome McNeill.

The President reported the new furnace recently purchased as being in place and in good working order.

The following named applicants were duly elected to regular membership: J. H. Whitaker, Dr. J. P. Crawford, E. W. Boynton, William H. Hender, E. M. White, George J. Washburn, James F. Lardner, Paulo Roddewig, Rev. William Stevens Perry.

Prof. H. F. Wickham of the Iowa State University, and Prof. Jerome McNeill of the University of Arkansas, Fayetteville, were elected corresponding members.

*January 7, 1896. — ANNUAL MEETING.*

President Hammatt in the chair; thirteen members present.

RECORDING SECRETARY'S REPORT.

TO THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

The Recording Secretary begs leave to report that there have been held during the year, besides the annual meeting, ten regular meetings with an average attendance of seven, and two trustees' meetings with an average attendance of six.

Twenty-seven members have been elected — 24 regular, 2 corresponding and 1 honorary. At present there are 72 regular members and 54 life members. One honorary member, Prof. C. V. Riley, has died.

A. W. ELMER

January 7, 1896.

LIBRARIAN'S REPORT.

TO THE OFFICERS AND MEMBERS OF THE DAVENPORT ACADEMY OF NATURAL SCIENCES:

Your Librarian respectfully reports as follows: Additions since last report, exclusive of the daily papers, bound volumes, 129; unbound volumes and pamphlets, 1,126; total, 1,255. Of this number 485 were from foreign countries.

Thus from time to time this department of our important trust is increasing in extent and value. Early in the present year, owing to the need of space in the library, it became necessary to remove there-

from the large cases of specimens which occupied the west wall and to rearrange and largely add to the book-shelves, so that now the entire wall space, from floor to ceiling is utilized, each section being numbered and each shelf designated for convenience in indexing. All this has been accomplished without great expense, but with no inconsiderable labor, a few zealous members having assisted your Librarian with generous contributions of mechanical skill and physical strength.

In this department my successor in office will find much yet to be done. There is work for him and work for the binder, and some of it should not be long delayed. An appropriation of, say \$50, would make a good beginning, and is recommended.

Then the Finding List should be pushed to completion — this is a crying need — the index must be made, and I fear it is futile to expect it by voluntary or gratuitous labor. The expense, whatever its amount, is abundantly warranted, and under the direction of the new Librarian, some competent person should be employed to execute the work.

January 7, 1896.

C. E. HARRISON, *Librarian*.

#### CORRESPONDING SECRETARY'S REPORT.

The Corresponding Secretary most respectfully reports that during the year 1895 he has received 102 letters and has written letters and special acknowledgments numbering 200.

The correspondence has been as varied as in former years. Among the most important communications are those in reference to special and valuable gifts made to the Museum. Individuals seek information on particular subjects in which they are interested, which information can only be found in our publications. Societies and institutions, at home and abroad, either ask exchange of publications or desire to make up deficiencies in their series.

When new papers are issued on subjects of interest to the Academy application is made for them and their authors uniformly respond favorably.

Other subjects coming before the Secretary, and appeals made to us for help from so many sources, emphasize the position of the Academy in the public favor.

W. H. BARRIS, *Corresponding Secretary*.

January 7, 1896.

#### CURATOR'S REPORT.

In January last Dr. John E. Stevenson presented to the Academy some specimens of pottery, several species of flint implements from Tuscararas River and near the mouth of Stillwater Creek, Ohio; also a piece of a tree from the celebrated cemetery at Garden Hutton, with a carefully detailed history of the same.

In February Capt. Hall, the life-long friend of the Academy, made his usual visit and donated 3 stone axes and 200 flint implements; also, as the gift of a friend, 1 very large axe and 24 arrows, and at the same time a small collection of arrows from Father Thebes of Rap-

ids City. In December he added another equally extensive collection of flint implements and 20 stone axes.

In March Mrs. William C. Wadsworth presented to the Academy 2 extraordinarily fine specimens of the coral known as the *madripora convexa*, the larger mounted in a glass case. These were new to the Academy. Accompanying these were 3 specimens of *aricula margatifer*, finer and larger than any in the Academy; also 3 specimens of *haliolites iris*, large and perfect.

In April a collection was received from Dr. Clarence B. Moore of Philadelphia, comprising the following aboriginal relics from Florida: Five long celts of exquisite proportions, made of very fine sandstone; 2 conch shells, with perforations to admit handle; 1 unique drinking-cup of shell, having a perforation for suspension to the person; 1 box of crimson pigment, always associated with human remains; 2 flint arrows, and 1 piece of smooth quartz rock.

In May the most comprehensive and one of the most important additions made to the Museum for years came from Dr. S. C. Bowman of Andalusia, whose frequent gifts have so often enriched our shelves. The wide range of his material and its diverse character make it difficult to arrange it so as to give a satisfactory presentation of it in a short, compact way. There is an extensive palæontological collection. It comprises a series of fossils from the Cincinnati group, mainly from Ohio. These in number and preservation compare very favorably with those presented to us years ago by Mrs. Haines. There is another series from the Niagara group gathered at the Bridgeport quarries near Chicago — shells, crinoids, and trilobites — all new to our collection. The Hamilton of Ohio furnished a few species, but the largest series is from our own state, and mainly gathered in the neighborhood of Andalusia and Buffalo. There is no doubt truth in Dr. Bowman's statement that this collection is probably the most complete ever made of the Hamilton in Eastern Iowa, and could not now be duplicated. Forms occur not only new to us but new to science, and which we trust may be described and illustrated in Volume VI. of the PROCEEDINGS of the Academy. Another and fourth collection is from the silurian and cretaceous of El Paso, Texas, and the cretaceous of Wyoming. From the conglomerate of El Paso we have three large elephant teeth — enamel fairly well preserved. In these various collections the locality in all instances is given.

In palæobotany mainly from the coal measures of Andalusia, are well preserved plants, mostly *lepidodendra*, *sigillaria* and *stigmara*; some fruits in good condition all the more valuable as the doctor claims the locality is now exhausted.

There is a box of marine shells from West Florida and land shells from West Texas.

In comparative anatomy there are skeletons of an African monkey, a white-fronted goose and a yellow-legged tattler; also a porcupine skull.

In ornithology we have a number of mounted birds from Illinois and Iowa.

In oölogy we have a collection of rare birds' eggs, such as the frigate bird, gulls, terns, etc., from Florida and Yucatan; the scaled partridge of West Texas, an accurately colored cast of the egg of the great auk, with many eggs from the Calumet marshes near Chicago—about 75 species—all numbered according to the Smithsonian check list of eggs.

There is also a cast of the egg of the *epiornis maximus*, from the original in the British museum.

Archæology is represented by specimens from Illinois and New Mexico.

In mineralogy we have from Andalusia crystals of selenite, and at least 75 pounds of gold, silver and lead ores from Black Hawk, Colorado.

There is one extraordinary specimen of crystals of molybdate of lead which Dr. Bowman prized highly on account of its size and rarity.

In entomology, we have been favored with a collection of *colcoptera* from Prof. Jerome McNeill of the Arkansas Industrial University, Fayetteville, Arkansas. Each specimen represented is new to science and they are to be made the subject of a paper the author is preparing for the forthcoming volume of the PROCEEDINGS of the Academy. The collection numbers 62 species, embracing 120 specimens. Should these prove to be, as I have every reason to believe, type specimens, the value of the collection is greatly enhanced.

No one can look on this list without feeling the Academy is to be congratulated in view of such additions to its museum as this year has witnessed. They are considerably in advance of those made for many years, whether we consider their number or their value. They are well selected, well preserved and represent many departments of natural science. Geology, mineralogy, palæontology, ornithology, oölogy, archæology, conchology and entomology have each bountifully contributed to us their treasures.

W. H. BARRIS, *Curator*.

January 7, 1896.

#### REPORT OF THE PUBLICATION COMMITTEE — ABSTRACT.

Mrs. M. L. D. Putnam, chairman of the committee, reported in substance as follows:

The binding of 200 copies of Volume V. in cloth, completes a volume, the first page of which was printed in April, 1895. The die used on the cover of Volume V. is a reproduction of the seal of the Academy which was designed by a committee and accepted by the Academy as its seal in 1895.

While awaiting the completion of Volume V. your committee has not been idle, and the first page of Volume VI. appeared December 14, 1892.

The first paper was the "Bibliography of Iowa Antiquities," by Frederick Starr, Ph. D., followed by a paper on "Buddhism in America," by Edward L. Berthoud; "Ancient Grooved Rocks in Arkan-

sas," by W. A. Chapman; "Biographical Sketch of Charles Christopher Parry," by Dr. C. H. Preston, and a list of papers published by the late Dr. C. C. Parry.

The work proper for this year began February 9, 1895, when your committee published a "Summary of the Archæology of Iowa," by Frederick Starr, Ph.D. This very valuable contribution of 72 pages was bound in paper and distributed to those interested in the subject.

A circular of "Suggestions Regarding Work in Archæology," and a statement made by the Academy, were sent to every prominent newspaper in Iowa. A number of responses have been received, showing an awakened interest in the opening of the mounds in a scientific manner.

On October 17, 1895, H. F. Wickham, Associate Professor of Zoölogy, State University of Iowa, presented a most acceptable biographical sketch of the distinguished entomologist, the late Prof. C. V. Riley, who was an honorary member of the Academy. This paper was read before the Academy and will appear in the regular proceedings.

There is now in press a paper entitled "A List of Coleoptera from the Southern Shore of Lake Superior, with Remarks on Geographical Distribution," by H. F. Wickham, M. S. Prof. Wickham purposes to place a series of the insects mentioned, so far as they are to spare, in the cabinet of the Academy, where they may be consulted by those interested in the paper.

Another paper received for publication is a "Revision of the Truxalinæ of North America," by Jerome McNeill, Professor of Biology and Zoölogy, University of Arkansas. Illustrations will be made of the typical specimens of all the generæ (about 80, of which 10 are new) and drawings of the new species.

Prof. McNeill has already sent to the Academy 62 species and 120 specimens.

Other papers that have been presented are: One on "Geology" by Dr. W. H. Barris, and one on "Serpent Mounds" by J. M. Helmick.

An endowment of the publication fund has been made by the Chairman of this committee to the amount, at present, of nine thousand five hundred (\$9,500) dollars, as a memorial to the late Charles E. Putnam and Joseph Duncan Putnam, former Presidents of the Academy, the funds for this purpose being derived from a generous bequest of the late Mary Putnam Bull of Tarrytown, New York.

#### PUBLICATION COMMITTEE'S FINANCIAL STATEMENT FOR 1895.

##### RECEIPTS.

Balance in Bank.....	\$ 36.00
From Sale of Publications.....	58.65
From Trustees' Fund.....	118.00
Borrowed from Chairman of Publication Committee.....	77.00 — \$289.65

## EXPENDITURES.

Paid on account Volume V.	
Brass Die .....	\$ 10.00
Binding Volume V.....	52.50
Binding 20 Copies Volume II.....	3.00 — \$ 65.50
Paid on account Volume VI.	
Binding 600 Summaries.....	\$ 4.50
600 Covers, Summaries.....	5.50
2,100 Map Inserts .....	3.50
Printing Summary of Iowa Archaeology.....	156.50
Wood-cuts .....	14.00
Electrotypes.....	6.50 — 190.50
Balance on hand January 7, 1896 .....	33.65
	<u>\$289.65</u>

Respectfully submitted,                      MARY L. D. PUTNAM,  
January 7, 1896.                                  *Chairman Publication Committee.*

## TREASURER'S REPORT FOR 1895.

## RECEIPTS.

Balance on hand January 1, 1895 .....	\$ 107.93
Subscriptions .....	109.00
Dues .....	171.00
Door Receipts .....	37.74
Membership Fees.....	45.00
Interest .....	70.00
Newbold Estate.....	106.00
Sale of Proceedings.....	16.00
Rent .....	11.00
Refunded by Mrs. Putnam.....	4.00
Collected by Mrs. Putnam for General Fund.....	368.23
Total Receipts.....	<u>\$1,045.90</u>

## DISBURSEMENTS.

Curator .....	\$ 328.36
Fuel and Light.....	32.75
Water .....	16.00
Insurance.....	34.00
Captain Hall.....	3.50
Publication Fund (Mrs. Putnam).....	20.00
Plumbing .....	6.90
Repairs.....	23.42
Lumber and Hardware .....	8.40
Walk .....	36.50
M. Bunker.....	12.60
Refunded to Mrs. Putnam.....	24.23
Paid out by Mrs. Putnam (Curator's Salary and General Fund)...	368.23
Incidentals (Janitor, Postage, Expressage, etc.).....	89.77
Balance on hand .....	41.24
Total Disbursements .....	<u>\$1,045.90</u>

Respectfully submitted,                      FRANK NADLER,  
January 7, 1896.                                  *Treasurer.*

## PRESIDENT'S ANNUAL ADDRESS.

EDWARD S. HAMMATT, January 7, 1896.

In reviewing the work of our Academy for the past year, a few suggestions may be made, which possibly leading to others of greater importance, may prove an incentive to renewed activity in the field of original investigation.

In some departments of the museum, as in mineralogy and conchology, little has been accomplished except in the way of getting ready for work by re-arranging cases for these collections. In zoölogy and ornithology a number of interesting specimens have been added to the collections. Chemistry is one of the departments of the museum, and at one time biology was also on our list. Workers in both should find facilities for original investigations in this building. To carry on such work a thoroughly equipped laboratory is necessary and should be secured as soon as may be. Such a laboratory would also be of the greatest advantage to workers in other departments of natural science.

Our botanical collections have been put to good use during the past year by students in this branch of science. It may be well to state again, as has been repeatedly done, that our valuable collections are, under proper regulations, available for study to those not members of the Academy.

We are still receiving large numbers of stone and flint implements secured for us by that most zealous collector, Captain W. P. Hall. Our already priceless collection of mound relics will receive valuable additions in the coming year if workers and funds can be secured. Several mounds of promising value have recently been located as a direct result of Prof. Frederick Starr's "Summary of Iowa Archæology," and the circulars of instruction sent out under the auspices of the Academy. While the archæological field of Iowa is in a measure limited, as far as we know at the present time, to the work of the mound builders and Indians, the subject is one of great importance in the almost modern field of anthropology. To this field and Egyptian history, Prof. Petrie's marvelous explorations, early in the past year, gave a new race, a race totally unlike the ancient Egyptians, contemporaneous with them, but more cultivated.

One of the most important parts of museum work is the accurate labeling of specimens. For this, with a special reference to palæontology, we are fortunate in having the valuable services of Prof. W. H. Barris, our curator.

The Library is constantly receiving valuable additions in the way of exchanges and government publications. To further increase the library it would be well if foreign governments could be induced to place our Academy on their publication lists; some means should be devised to secure this end. Good work has been done by part of the Library Committee and a few other interested members in adding more shelf-room, numbering sections and shelves, and in re-arranging books and pamphlets. As soon as funds are available an appropria-

tion should be allowed the Library Committee for needed binding and for cataloguing our more than 30,000 books and pamphlets.

A serious question which must be met in the near future is that of securing more room for our always increasing collections. The building is already overcrowded. A small amount of additional space could be secured were donors willing to allow us to separate their collections and re-arrange them according to the general classification required, due credit being given the donor of specimens on each label. Many of the larger museums refuse to accept donations conditional on their being kept intact — a wise precaution which we should adopt.

That the Academy may extend a wider educational influence, short descriptive papers on different topics of natural history, illustrated by our specimens, might be prepared by Academy members in the line of their special studies. Such elementary pamphlets would serve to permanently fix in the minds of the youth of the public and private schools the objects seen in the collections: and these pamphlets, if properly arranged, might in time serve as a complete catalogue to the Museum. Popular scientific lectures should also be made a regular feature of Academy work at an early date. In speaking of the museum it may be mentioned that while our duplicates are carefully labeled, listed, and used for exchanges, casts of unique specimens might also be added to the exchange list.

It has been suggested by our Librarian, Mr. C. E. Harrison, that a museum extension be arranged with other museums. This timely suggestion should be worked out to a practical result.

An important function of the Academy is the publication of scientific papers on original investigations. This work has been successfully carried on, almost from the beginning of our organization, without an endowment fund, mainly through the indefatigable and persevering labors of Mrs. M. L. D. Putnam. Through the same generous friend, an endowment of \$10,000, chiefly from the estate of Mrs. Mary Putnam Bull of Tarrytown, New York, has been secured for the publication fund, as a memorial to Mr. Charles E. Putnam and his son, J. Duncan Putnam, both of whom were active workers in the Academy and ably filled the presidential office.

By means of this endowment fund, all regular and life members of the Academy will hereafter be entitled to its publications free. Gratifying results of this stimulus to original research have already been felt, for the committee have now in process of publication two valuable papers: "A List of Coleoptera," by Prof. H. S. Wickham, of the University of Iowa, and "A Revision of the Truxalinæ of North America," by Prof. Jerome McNeill, of the University of Arkansas. These, with others in course of preparation, will insure the issuance at an early date, of the remaining parts of Volume VI. of the ACADEMY PROCEEDINGS.

In future publications of the PROCEEDINGS, and parts as issued, it might be advisable for the Publication Committee to investigate the proposed plan of the Royal Society of London, of a uniform method

of cataloguing scientific publications, as more fully explained by the Harvard University Council. Each society should accompany its own publications with duplicate card catalogues, and request them with all exchanges.

In looking over some of the past volumes of our PROCEEDINGS a lack of uniformity is seen in the system of measurement adopted. It is said that one of the greatest reforms of the Nineteenth Century is the adoption of the metric system, legally adopted by this and many foreign countries. This uniform system should be used exclusively in scientific work and publications and should be made an imperative requirement in papers accepted for publication.

At the first meeting of the Academy, December 14, 1867, among the honorary members elected was Prof. Charles Valentine Riley, whose career has but recently been brought to a sudden close with seemingly many years before him for useful scientific work. In Prof. Riley the Academy loses an interested friend and the world a distinguished entomologist.

During the past year the regular membership has been somewhat increased, and new as well as old members should be reminded that they are expected to take an active interest in the Academy. It is hardly necessary to further dwell upon the needs of the Academy; suffice it to say, that an institution such as ours, to do efficient scientific work must have funds at its disposal to carry on explorations and investigations.

#### ELECTION OF OFFICERS — 1896.

*President* — EDWARD S. HAMMATT.

*Vice-President* — DR. A. W. ELMER.

*Recording Secretary* — EDWARD BORCHERT.

*Corresponding Secretary* — Prof. W. H. BARRIS.

*Treasurer* — FRANK NADLER.

*Curator* — Prof. W. H. BARRIS.

*Librarian* — C. E. HARRISON.

*Trustees for Three Years* — Mrs. M. L. D. PUTNAM, GEORGE P. McCLELLAND, Rev. A. M. JUDY, W. C. PUTNAM.

Prof. Frederick Starr was proposed as an honorary member of the Academy and was unanimously elected.

At the close of the business session Dr. Edward Gudeman read an able and instructive paper on "Old Theories in Chemistry," presenting a scholarly review of the growth of chemical science.

#### January 23, 1896. — TRUSTEES' MEETING.

President Hammatt in the chair; eight members present.

Treasurer Frank Nadler presented his report for the year just closed, showing a balance on hand, January 1, 1896, of \$41.24 in the general fund. The report was referred to the Finance Committee.

The Trustees discussed the financial outlook for the year, which was thought fairly favorable.

On motion, the sum of \$50 was placed at the disposal of the Library Committee to be expended on Library needs.

*January 31, 1896. — REGULAR MEETING.*

President Hammatt in the chair; six members and a number of visitors present.

The Publication Committee reported Prof. Wickham's paper on "Coleoptera" printed.

Messrs. A. Tredick and C. N. Newcomb were elected regular members.

The President announced Standing Committees for the year as follows:

*Finance* — W. C. Putnam, J. B. Phelps, J. H. Harrison.

*Publication* — Mrs. M. L. D. Putnam, Prof. W. H. Barris, Dr. Jennie McCowen, Prof. S. Calvin, Dr. C. H. Preston.

*Museum* — Archæology, C. E. Harrison; Geology and Palæontology, Prof. W. H. Barris; Conchology, Miss S. G. Foote-Sheldon; Chemistry, Dr. Edward Gudeman; Zoölogy, Dr. A. W. Elmer; Mineralogy, Fred P. Bemis; Botany, Louis Block; Historical Collections, E. S. Ballord.

*Library* — C. E. Harrison, Edward Borchardt, C. H. Preston.

Prof. Udden of Augustana College delivered an interesting lecture on "Kansas Mounds," illustrating his remarks by crayon sketches.

*February 29, 1896 — REGULAR MEETING.*

President Hammatt in the chair; seven members and a number of visitors present.

The Curator reported the donation from T. Richter & Sons, furriers of this city, of a carefully preserved skin of a white skunk, received by their agent in a collection from the Sac and Fox Indians. This is a very rare specimen, the donors having never before in their business seen or heard of such a one.

The following resolutions on the death of Prof. Charles Wachsmuth of Burlington, Iowa, were read and adopted :

*Resolved*, That the Academy has heard with profound regret of the death of Prof. Charles Wachsmuth, an honored member of this Academy and a valued contributor to its PROCEEDINGS. It is fitting that, while we record our sense of the loss we have sustained, we should express our appreciation of the great work he has wrought for science in the particular department to which he devoted his life—a work accepted at home and recognized abroad by naturalists engaged in the same and similar research, as one of the most important in the history of geological and palæontological investigation. As we call to mind the amount of conscientious labor he performed through a score of years, we wonder how it could have been accomplished, while so often battling with bodily suffering, his iron will, with cheerful fortitude, rising superior to physical infirmity and nerving him to fresh devotion to his work. We may note as a marked characteristic of this student of nature that the treasures he gathered at such vital cost to himself were distributed freely and generously to others. All were encouraged to come to him for assistance. His work accomplished, he passed quietly away, in the very locality whose surroundings had first awakened his early enthusiasm. Remembering the happiness of his home, with his affectionate and devoted wife, fit sharer in his labors and encourager of his work, we extend to her our warmest sympathy in her great affliction.

*Resolved*, That these resolutions be recorded in the minutes and that copies be sent to the family of the deceased and to the press.

W. H. BARRIS,  
C. H. PRESTON,  
*Committee.*

Mrs. W. F. Peck, Mrs. C. A. Ficke and Mr. Emil Geisler were elected to regular membership.

Observer Walz delivered an interesting lecture, illustrated by charts, on the work of the U. S. Weather Bureau.

*March 27, 1896.*—REGULAR MEETING.

President Hammatt in the chair; seven members present.

The Curator reported the donation to the museum by Mr. A. F. Mast of some historical relics, viz: Two appointments of the donor to the office of deputy postmaster of Davenport; the first signed by President Pierce in 1856, and the second by President Buchanan in 1860, both stamped with the seal of the United States.

The donation from Dr. Clarence B. Moore, of the columella of a large conch shell worked into marketable shape, was also reported. Such worked shells are sometimes found in Florida mounds, but not, the donor believes, in those of Iowa.

On motion of Dr. Gudeman, a committee consisting of Messrs. F. J. Walz, J. H. Harrison and M. Bunker was appointed to draw up resolutions endorsing the proposed adoption of the metric system by the government, copies of the resolutions to be sent to our members of congress.

Following the business session the Academy adjourned to the rotunda where Prof. Launcelot W. Andrews of the Iowa State University, assisted by John D. Fish, Electrician, delivered an interesting lecture on the subject, "Some Properties of Highly Rarified Gases." The lecture was listened to by a select audience filling the rotunda and presented a highly instructive consideration of the nature and properties of the recently discovered "Roentgen" or "X" rays.

*April 24, 1896*—REGULAR MEETING.

President Hammatt in the chair; six members present.

The Curator reported valuable additions to the library from Miss Clara Holmes and Hon. George T. Baker. The thanks of the Academy were extended to Prof. L. W. Andrews for his instructive lecture of March 27, and on motion of Mr. C. E. Harrison, the following supplementary resolution was adopted:

*Resolved*, That the thanks of the Academy be tendered Mr. A. W. Vander Veer, president of the Peoples' Light Company, and Messrs. J. Charles Young, J. D. Fish of this city, and Dr. Wm. H. Ludewig of Rock Island, for assistance rendered in making the lecture of Prof. Andrews a success.

*May 29, 1896*—REGULAR MEETING.

President Hammatt in the chair; six members present.

The Curator reported the donation from Hon. C. A. Ficke of an Egyptian mummy and case, shipped by him from the Boulak museum, Cairo, Egypt, and received at the Academy in good condition. This very generous donation, made yet more valuable by the known scholarship of the giver and his carefulness as a collector, had been announced by the following letter:

CAIRO, March 21, 1896.

ACADEMY OF NATURAL SCIENCES, DAVENPORT, IOWA:

*Gentlemen*—I take pleasure in stating that I have to-day purchased and caused to be shipped to the Academy by the Museum here, a mummy with box, which I request the Academy to accept from me. The mummy and case are supposed to be from the 20th dynasty or thereabouts. I was able to arrange for the prepayment of freight only as far as New York, but have

instructed my office to pay the freight from New York to Davenport upon the arrival of the box containing mummy and case, which was addressed and ordered shipped direct to the Academy, however.

Respectfully yours, C. A. FICKE.

Curator Barris congratulated the Academy on this addition to its archæological treasures, acknowledged its indebtedness to the donor, and expressed his conviction of the unquestionable genuineness of the relic.

Mrs. Putnam announced that the bequest of \$9,500 by Mrs. Mary Putnam Bull had been received and was now at interest for the use of the publication.

*June 26, 1896* — REGULAR MEETING.

President Hammatt in the chair; five members present.

The donation of 75 flint implements and a stone axe from Capt. W. P. Hall was reported.

Messrs. Charles Francis and Claude L. Adams were elected regular members.

The following resolution, presented by Dr. C. H. Preston, was on motion adopted as the sense of the Academy:

WHEREAS, A bill restricting the practice of vivisection has recently been presented and urged for congressional action, and

WHEREAS, Such a law, if enacted, would not only injuriously affect the work of the government experiment stations, but might serve as a precedent for state restrictions; therefore

*Resolved*, That the Davenport Academy of Natural Sciences joins most earnestly in the general protest of scientific associations throughout the Union against so unwise and unjust a measure.

While condemning and deprecating all cruelty and the infliction of unnecessary suffering for any purpose whatsoever, we believe there is no call for legal restrictions on vivisection as conducted by the biologist in the interest and for the promotion of scientific research.

Such legislation must seriously hamper, if indeed it did not discourage and prevent, investigations essential to the knowledge and control of communicable diseases, both those affecting man and those pertaining to the domestic animals, and would thus become responsible for perpetuating the causes of infinitely more suffering than it could possibly prevent.

*July 31, 1896* — REGULAR MEETING.

President Hammatt in the chair; five members present.

The donation of some flattened minnie bullets from Atlanta and some Aztec "pocket-deities" from Mr. A. C. Fulton was reported.

Mr. R. P. Osborn was elected a regular member.

The Executive Committee reported that a contract had been made with the Davenport Granitoid Company to lay a cement floor in the west basement room of the Academy building at an expense of 9 cents per square foot, the contractors to remove the present wooden flooring and move the cases.

*August 28, 1896.*—REGULAR MEETING.

President Hammatt in the chair.

Benjamin R. Putnam was elected to life membership.

Mrs. M. L. D. Putnam was appointed a delegate to the American Association for the Advancement of Science about to meet at Buffalo, N. Y., and the Corresponding Secretary was instructed to forward her credentials, she being now in the East.

*September 25, 1896.*—REGULAR MEETING.

President Hammatt in the chair.

The donation from Capt. W. P. Hall of a large flint spear head—a very fine specimen—together with a number of arrow heads and two large stone axes, was reported.

*October 30, 1896.*—REGULAR MEETING.

President Hammatt in the chair; eleven members present.

The following resolutions on the death of Mr. William H. Holmes were presented and adopted:

WHEREAS, In the death of William H. Holmes, which occurred at his residence in this city on the morning of the 26th inst., the Academy loses one of its earliest and most honored members,

*Resolved*, That we hereby record our appreciation of his sterling worth as a man, of his life-long zeal in the search for truth, and of his valuable services as an officer of, and contributor to the work of the Academy.

*Resolved*, That we tender our deep sympathy to his sorrowing household and that copies of these resolutions be sent to them and to the city press.

W. H. BARRIS,  
ARTHUR M. JUDY,  
C. H. PRESTON,  
*Committee.*

President Hammatt, Mrs. Putnam and others added warm personal tributes to the worth of the deceased.

After the business session the Academy adjourned to the Library

room, where a large audience was assembled to listen to a lecture by Mr. George R. Putnam on the Peary Expedition of the past summer, which expedition Mr. Putnam accompanied as a representative of the U. S. Geodetic and Coast Survey.

Preceding the lecture an interesting report of the last annual meeting of the British Association for the Advancement of Science, held at Liverpool, and attended by the writer, Mr. E. K. Putnam, was read.

THE GREENLAND EXPEDITION OF 1896 UNDER CHARGE OF  
PROF. A. E. BURTON.

SUMMARY OF LECTURE BEFORE THE DAVENPORT ACADEMY OF SCIENCES,  
BY G. R. PUTNAM, OCTOBER 30, 1896.

This expedition was organized by Prof. Burton of the Massachusetts Institute of Technology to carry on various investigations in Umanak Fiord, in the northern part of Danish Greenland. The party was to be carried to and from its destination by Lieut. Peary, the well-known arctic explorer. The voyage was but a summer trip to moderate latitudes, devoid of the conventional arctic hardships, and yet the peculiar advantage of such a trip to Greenland is that many of the grandest of arctic phenomena may here be seen in easily accessible regions. The steamer "Hope," a staunch Newfoundland sealing ship, under command of Capt. John Bartlett, carried Lieut. Peary and the various parties north from Sydney, Nova Scotia, sailing from there July 16, 1896. Passing through the straits of Belle Isle we were soon in the regions of icebergs and floe ice. Magnificent specimens of the former were encountered before we left the straits, and they were never lacking to the scene during the entire balance of the voyage. An unusual quantity of floe ice was met along the Labrador coast, which we followed closely to Hudson Strait. The ice sometimes became so thick as to seriously impede the progress of the ship. While in this ice we had some beautiful and fantastic effects of the mirage. A polar bear and cubs were seen on the ice off Cape Chudleigh, the latter being captured alive after the shooting of the mother.

Passing into Hudson Strait the "Hope" was soon clear of the ice. After steaming two hundred miles along the north shore we reached Ashe Inlet on July 24. Here, and on the mainland opposite, two days were spent by the various parties in exploration. At this point some years ago the Canadians had a station for investigating the climate and navigability of Hudson Strait. On the way out of Hudson Strait we had our first good view of the Eskimos. A few of them in their kayaks hailed the ship, and the entire settlement followed in a large skin boat, bringing many articles to trade. Notwithstanding the utterly bleak and forbidding appearance of this region, they appeared to be a happy people; their round, fat faces simply beamed with good nature. They were dressed in furs, men and women much alike, ex-

cept that the women's blouses had a long tail behind, and a large hood or sack on the back in which the baby was carried. An attempt to enter Cumberland Sound failed because of the heavy ice in the entrance. Crossing Davis Strait the Greenland coast was sighted on August 1, and the following day we reached Godhaven, the capital of the Danish Inspectorate of North Greenland, and were cordially received by the Danish officials. Passing through the remarkable passage east of the island of Disco, known as the Vaigat, we entered Umanak Fiord on the night of August 4. Here is to be seen some of the finest scenery on the Greenland coast, and it was particularly impressive on this calm arctic summer night when the sun only dipped below the horizon for an hour. The "Hope" left our party at the village of Umanak, the principal settlement of the district, which was to be our headquarters for several weeks, and where the vessel was again to return for us after its trip further north. The village consists of about 150 Eskimos and three Danish families. It was through the courtesy of Governor Knuhtsen at Umanak that I was enabled to purchase an Eskimo kayak which has been shipped to this institution.

In their management of their Greenland possessions the Danes have followed a unique plan. There are about 10,000 Eskimos in Danish Greenland. In each of the twelve districts there is usually a governor and assistant in charge of the commercial affairs, and a Lutheran pastor who cares for religious and educational matters. No other Danes or foreigners are allowed to settle in Greenland. The whole is under direction of the Royal Greenland Board of Trade, a government bureau in Copenhagen, which has a strict monopoly of the trade of Greenland. Ships each year bring out supplies from Europe which are sold to the Eskimos at but a slight advance over cost prices, and fixed amounts are paid to the natives for the furs, oil, ivory, etc., which products are shipped to Denmark. All other trade along this coast is prohibited. Every village has its church and school in which the children are taught their own language and not Danish. The great majority can read and write and are Christianized, nominally at least.

These Greenland Eskimos, although they have been in contact with civilization for 250 years, have retained many of their original modes of life. The more pure-blooded have smooth, round features and frank, open countenances, are short in stature and have straight, black hair. They live in flat-roofed houses built of rocks and turf, often but a single room with a sleeping bench at one end, and a long, low entrance for keeping out the cold in winter. In summer they often live in tents, moving from place to place. They hunt the seal, walrus, narwhal, reindeer, bear and smaller game. Much the most important to them is the hair seal, furnishing them clothing, boat covering, tents, oil and food. For the pursuit of this animal they have developed the kayak and its many appliances, perhaps the most ingenious ever invented by a primitive people. One of the feats of dexterity performed in these frail boats is to turn over and right themselves again

without getting out of the boat and without getting a drop of water into it. The language of the Eskimos is most peculiar and difficult for a stranger to master. It is composed almost entirely of nouns and verbs, and by suffixes and affixes to these the other parts of speech are added. It is possible to express a long sentence with a single word. The investigations of Rink have shown that all the Eskimos from eastern Siberia to eastern Greenland have words in common, proving the common origin of the race.

From Umanak several trips were made in small boats to the great glaciers at the head of the Fiord. The largest of these is the Karajak. The face of this glacier, from which the bergs break off into salt water, has a width of about four miles, a height above the water of over 250 feet, and in the center moves with a velocity of from 20 to 35 feet per day. A single iceberg breaking off from this glacier has been estimated to contain 24,000,000 cubic yards of ice. The breaking off of a berg is always a most interesting sight because of the great noise and commotion caused. The surface of a glacier near its front is a mass of jagged pinnacles with deep crevasses between. Further up the surface becomes smoother, and finally, back on the distant horizon, can be seen the smooth, white plain of the great ice-cap which covers Greenland. A climb to the summit of a 3,000-foot mountain near its edge gave a grand view of the inland ice and the glacial work along its border. That this ice sheet was once more extensive than it is now is proved by the rounded outlines and glacial scratches found even to the summit of the coast mountains. On the other hand the climate of Greenland must, at one time, have been very much warmer. In the vicinity of Umanak Fiord coal deposits and the fossils of semi-tropical trees are found. Notwithstanding the nearness of the ice-cap the present climate in Greenland is much milder than that on the opposite side of Davis Strait. In the fiords the summer is moderate and pleasant. Wherever there is soil there is an abundance of wild flowers and grasses, but no trees. A curious meteorological fact is that the Föhn wind which blows directly off the ice-cap, always brings the warmest weather, said to be due to its sudden descent from the elevated interior.

The "Hope" called for us at Umanak on September 9. Our homeward journey followed much the same course we had come over. We encountered the only storm of the voyage in crossing Davis Strait. Off Cape Mercy the "Hope" was caught in a heavy ice pack in which she was held for three days. Finally the ice loosened and the ship reached open water in Cumberland Sound. Two days were spent in the vicinity of Blacklead Island, a Scotch whaling station with a large Eskimo settlement. From here we brought to America an English missionary and the agent of an American whaling station, the latter bringing with him over a ton of bone taken from a single whale. The return from Cumberland sound was without incident save some beautiful auroral displays at night, and we landed at Sydney on September 26.

As to the special work on which I was engaged on this trip, only a few remarks will be added. At each of the stopping places where time permitted I made magnetic observations, determining the deviation of the compass needle from true north, the dip of the dipping needle, and the force of the earth's magnetism. Two of these stations were so near the magnetic north pole of the earth that the dipping needle stood within six degrees of the vertical. We were so far to the east of the magnetic pole that at Umanak the compass needle pointed nearly west. The horizontal magnetic force in these regions is very weak on account of the great dip, so that magnetic disturbances caused considerable changes in the needle, a change of four degrees being noted in a single day at one point. For the same reason the ship's compasses were very irregular. At some of these places magnetic observations have been made by earlier expeditions. A comparison of our results with theirs will aid in the study of the change in the earth's magnetism, which is continually in progress. At several points I also made pendulum observations for the measurement of the force of gravity. This force increases from the equator to the poles, and following the theorem of a French mathematician, Clairaut, we are able to compute the amount of flattening at the poles of the earth by comparing the force of gravity at different latitudes. The variations in this force also have an important bearing on various theories that have been advanced as to the condition of the earth's crust, and thus far may be said to point to the truth of the equilibrium theory, which supposes that the earth's crust is in a sort of floating condition, and that all general elevations on the surface are high because they are supported by lighter material beneath, and that depressed areas are low because they are heavy. By a well-known law the time of oscillation of a pendulum will be proportional to the square root of the force of gravity, so that if we compare the time of oscillation at different places we will obtain the relation of the force of gravity. For this purpose it is necessary to ascertain the time of a single swing within a few millionths of a second, and to accomplish this successfully an elaborate instrumental outfit is necessary. The chronometers used must also be rated by careful astronomical observations. The results of this work will be published in the *Technology Quarterly* at Boston, and also by the United States Coast and Geodetic Survey, which furnished the necessary instrumental outfit, and with which the writer is connected.

The lecture was fully illustrated by maps and charts, with many articles of Eskimo manufacture, raiment, etc.

*November 27, 1896* — REGULAR MEETING.

President Hammatt in the chair; four members present.

The Curator reported the donation by Mr. George R. Putnam of an

Eskimo kayak, together with all the appliances used by the native Eskimo in hunting and fishing. On motion it was

*Resolved*, That a vote of thanks be extended to Mr. George R. Putnam for the recent interesting and instructive lecture delivered by him before the Academy, on his trip to Northern Greenland with the Peary Expedition of the past summer; and for the gift of an Eskimo kayak, procured by him at Umanak, Greenland, with equipments complete for the capture of seal, etc.

On motion, the matter of devising a better system for the preservation of the Academy archives was referred to the Publication Committee, to report at the next meeting.

*December 26, 1896.*—REGULAR MEETING.

(Adjourned from December 25.)

President Hammatt in the chair; five members present.

The Curator's report showed donations to the Museum as follows: From Mrs. C. C. Parry, a large miscellaneous collection of minerals, corals, curios, and Indian work listed under sixty different headings and numbering several hundred specimens; from Major G. P. McClelland, two corals from the Bermudas; from Capt. W. P. Hall, two stone axes, one celt, two small hematite axes and twenty-six flint implements, with one fine celt from Ray Willard.

A vote of thanks to the several donors was passed.

The following report on measures for the better preservation of the Academy archives was presented and adopted:

The Publication Committee, to whom was referred the consideration of means for the better preservation of official reports, etc., pertaining to the Academy Proceedings, would respectfully recommend—

*First*—That all reports, resolutions, and other proceedings to be preserved as original archives, should be *required in writing on uniform sheets* to be kept at hand by the Curator; and that its title, date and signature should accompany each document.

*Second*.—That the Curator's monthly report should include, together with all matters more directly pertaining to the museum, the enumeration not only of visitors and door receipts as at present, but the enumeration of correspondence and additions to the library as well, so that the Corresponding Secretary and Librarian need only report when matters of especial interest give occasion to do so.

*Third*.—That the Treasurer's annual report should include the balanced account of the publication fund for the year, as submitted by the Chairman of the Publication Committee.

*Fourth*.—That no original papers should at any time be entrusted to re-

porters or other unauthorized persons, to be taken from the building ; and that the Recording Secretary should be instructed to return all such documents, so soon as he shall have transcribed them, into the custody of the Curator, to be by him classified and kept in a desk provided for this especial purpose.

Respectfully submitted,

MARY L. D. PUTNAM,

W. H. BARRIS,

C. H. PRESTON.

*For the Committee.*

The Secretary read a communication from Mrs. Margaret W. Holmes, under date December 8, 1896. Accompanying the letter was a check for twenty-five dollars from herself and daughter with the following note :

"Twenty-five dollars to be used in some practical way for the comfort and convenience of the frequenters of the Academy, to remind them of their friend and associate, William H. Holmes."

A vote of thanks was extended to the donor and President Hammatt, Dr. Barris and C. E. Harrison were appointed a committee to expend the money in accordance with the wishes expressed.

The Committee on Revision of the Membership List were, on request, granted further time to complete the work.

The following communication, embodying a report of the results of the Glazier expedition of 1891 to determine the true source of the Mississippi River, was presented by Mr. C. E. Harrison and referred to the Publication Committee :

TO THE OFFICERS AND MEMBERS OF THE DAVENPORT ACADEMY OF  
NATURAL SCIENCES.

On July 13, 1891, a letter was received from Capt. Willard Glazier expressing the desire that a member of this Academy join an expedition that he was organizing to go to the headwaters of the Mississippi during the month of August. At the solicitation of a number of officers and members of the Academy I accepted Capt. Glazier's invitation and accompanied him and his genial party. On my return I rendered a verbal report descriptive of the expedition. Now, however, as the PROCEEDINGS of the Academy from January, 1889, to the present time are to be published, it seems desirable and perhaps of historic importance, that some record of this expedition, of which the Librarian of the Academy was a member, should appear therein, and at the request of the President I herewith submit a brief statement in accordance with notes taken at the time. It will be remembered that in 1881 Capt. Glazier, with a small party, made a trip to the Lake Itasca region and discovered that the true source of the great river did not lie in Itasca. His party in meandering the shores of Itasca with the aid

of their Indian guide found a stream entering the south-west arm, through which they passed into a lake to the south, known to the Indians as Po-keg-a-mea. This lake the party, after a thorough exploration, determined to be the primal reservoir or true source of the great river, and in honor of Capt. Glazier named it Lake Glazier. The Captain does not pretend to have discovered this lake (neither did Schoolcraft discover Itasca) but was the first to publish to the world that the magnificent body of water, having a surface of 255 acres, and a perennial stream of good depth and width flowing from it into Itasca, is without doubt the true head of the river. It was to settle this much mooted question that the second expedition — by far the largest ever assembled for a like purpose — was organized.

Fourteen gentlemen responded to the invitation, assembling at Minneapolis, and on Monday, August 17th, commenced our journey by rail to Park Rapids, stopping at all important towns *en route*. To give a detailed description of our journey, which was full of pleasant surprises and enjoyment, would consume much time and be unimportant in this report. At Park Rapids three days were consumed in preparation for the journey through the wilderness. Teams being provided, and canoes, tents, provisions and other necessary camp equipage loaded, the start was made on Saturday morning, August 22. The road, or trail, from here to the head waters winds among the pine, and was as bad as could be imagined, up and down steep inclines, over boulders and fallen trees, through marshes and bogs, requiring the combined strength of horses and men to pull through the mire or up the steep inclines, and at all times the watchful care and utmost exertion of all the party to save our caravan from destruction. All the difficulties, however, were compensated for by the beauty of the forests and picturesqueness of our train. On arriving at the shores of Itasca we embarked in our canoes to Schoolcraft's Island, in the midst of Lake Itasca, where we camped for the night. All of next day was occupied in moving and preparing a permanent camp on the high land separating Lakes Itasca and Glazier. One incident of our camp-life was the delivery of a sermon in front of the tents on Sunday afternoon by Mr. John C. Crane, who was a licensed preacher of the Baptist faith. It was without doubt the first religious service held at the headwaters. During our stay we assisted the surveyors in measuring all the affluents flowing into the south-west arm of Lake Itasca, and all those emptying into Lake Glazier. In order to give details of the explorations as briefly as possible I will copy the following report, which was made upon our return to Park Rapids and signed by all of the party who were engaged in the actual surveys and measurements:

PARK RAPIDS, MINNESOTA, September 2, 1891.

"To Whom it May Concern:

"The undersigned were among the members of a party who visited the region around Lake Itasca with Captain Willard Glazier for the purpose of investigating it and ascertaining the facts concerning the head-waters of the Mississippi River. The party, while invited by Capt. Glazier, were under no obligations to him, directly or indirectly, and their purpose was (and

it was in accordance with Capt. Glazier's wish) to see for themselves and report impartially upon the facts ascertained by personal observation. This statement has been formulated and is hereby presented without Capt. Glazier's knowledge.

"Two streams were found entering the south-west arm of Lake Itasca, one to the south-west, known as Nicollet Creek; the other to the south-east, flowing from the Glazier Lake.

"Nicollet Creek was traversed from its mouth up to Nicollet's first and second lakes. The creek was still further traced until its source was found in a number of springs, to the south-east of which is a ridge varying in height from 25 to 40 feet. The distance from Lake Itasca to these springs was chained and found to be 7,307 feet, this being the remotest distance, in that direction, of running water. The ridge was ascended and crossed to Nicollet's Third Lake, so called, and the region beyond traversed for several miles. The stream flowing from the Glazier Lake to Lake Itasca was chained, also the Glazier Lake and its tributaries were followed up and chained. There are five tributaries to this lake, which is 1,100 feet from Lake Itasca, as follows: On the east side, 50 feet from the bank, a spring flows in a cascade to the lake. Deer Creek is 6,864 feet long. Excelsior Creek is 8,778 feet long, making the distance from its source through the Glazier Lake 14,106 feet. Horton Creek is 1,188 feet long, flowing from a lake two acres in area. Eagle Creek is 4,356 feet long, flowing from Lake Alice (924 feet long), and Lake Alice has a tributary 1,518 feet long. The distance of the most remote running water from Lake Itasca, flowing through the Glazier Lake to Itasca (the source of Excelsior Creek) is 6,770 feet more than the distance from Lake Itasca of the most remote running water flowing into Itasca through Nicollet Creek. The Glazier Lake has an area of 255 acres. It is a clearly defined body of water, many times larger and more imposing than any or all of the bodies of water emptying into Lake Itasca through Nicollet Creek. Investigation and observation lead us to the conclusion that the basin drained by the feeders to the Glazier Lake and emptying into Itasca at the south-east corner of the south-east arm is larger than that drained by the stream emptying into the south side of the south-west arm, and that running water can be traced at a much greater distance from the outlet of the Glazier Lake into Lake Itasca than from the other outlet referred to.

Signed,

JOHN C. CRANE.  
C. E. HARRISON.  
A. MUNSELL.

DANIEL S. KNOWLTON.  
FRED J. TROST.  
W. S. SHURE.

A. W. WHITNEY."

The above presentation gives an idea of the work done and results accomplished. Each member of the expedition has placed in the hands of Capt. Glazier a letter fully endorsing his claims as the discoverer of the source of the great river.

C. E. HARRISON.

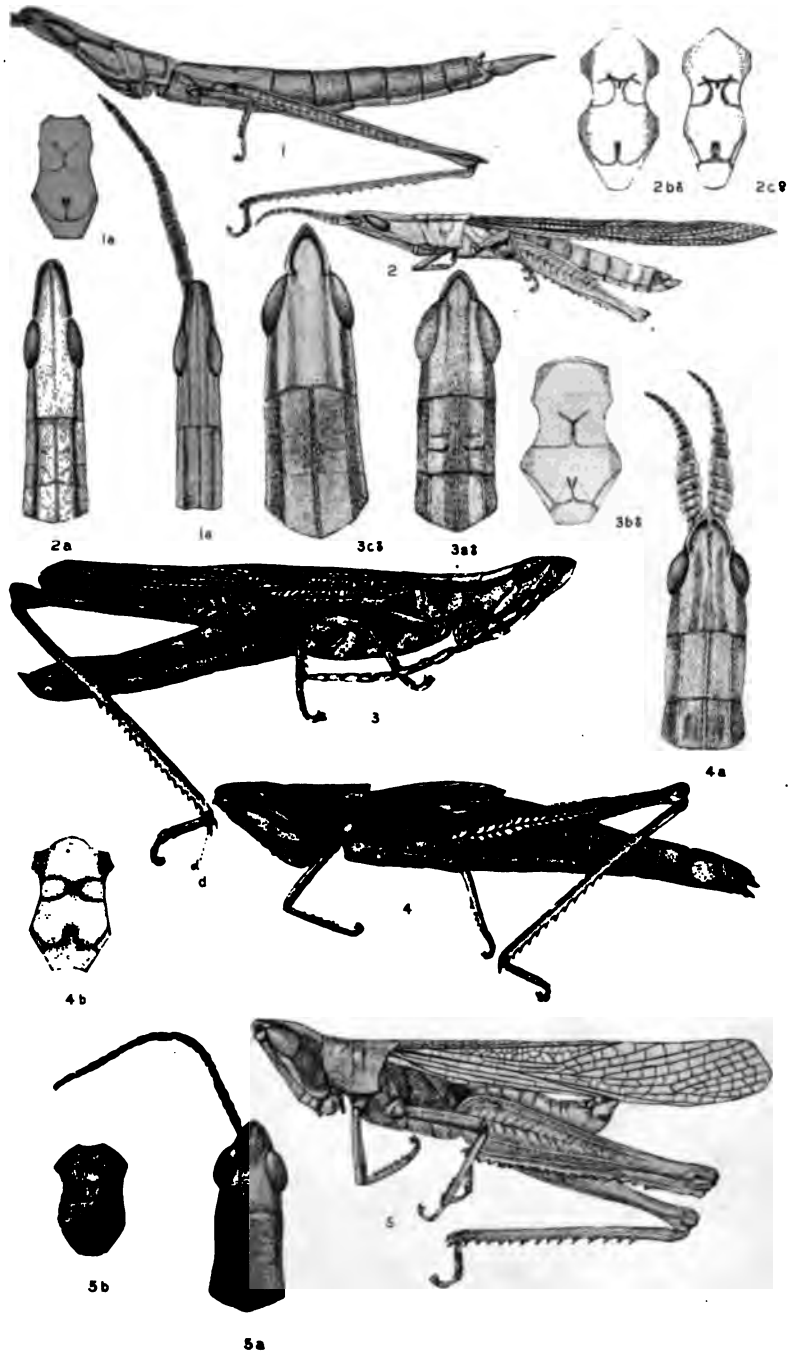
Davenport, December 25, 1896.



## PLATE I.

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1. *Radinotaton brevifenne*, Thos., n. gen. Male; a — upper view of head and pronotum; b — sternum.
2. *Achurum sumichrasti*, Sauss. Male; a — upper view of head and pronotum; b — sternum; c — sternum, female.
3. *Mermiria alacris*, Scud. Male; a — upper view of head and pronotum; b — sternum; c — *Mermiria rostrata*, n. sp., upper view of head and pronotum; d — inner apical spurs of the posterior tibiae.
4. *Pseudopomaha bracyptera*, Scud. Female; a — upper view of head and pronotum; b — sternum.
5. *Truxalis brevicornis*, Linn. Male; a — upper view of head and pronotum; b — sternum.



Miss A. Stansfield, com. loc. et det.

Miss A. Stansfield, del.





## PLATE II.

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6. *Napaia gracilis*, n. sp. and gen. Male; a — upper view of head and pronotum; b — sternum; c — sternum, female; d — lateral view of female.
7. *Opeia obscura*, Thos., n. gen. Female; a — upper view of head and pronotum; b — sternum; c — sternum, male.
8. *Pedeticum obscurum*, Scud., n. gen. Female; a — upper view of head and pronotum; b — sternum; c — unequal inner apical spurs of the posterior tibiae.
9. *Eritettix virgatus*, Scud. Female; a — upper view of head and pronotum; b — sternum.
10. *Syrbula acuticornis*, Bruner. Male; a — upper view of head and pronotum; b — sternum.



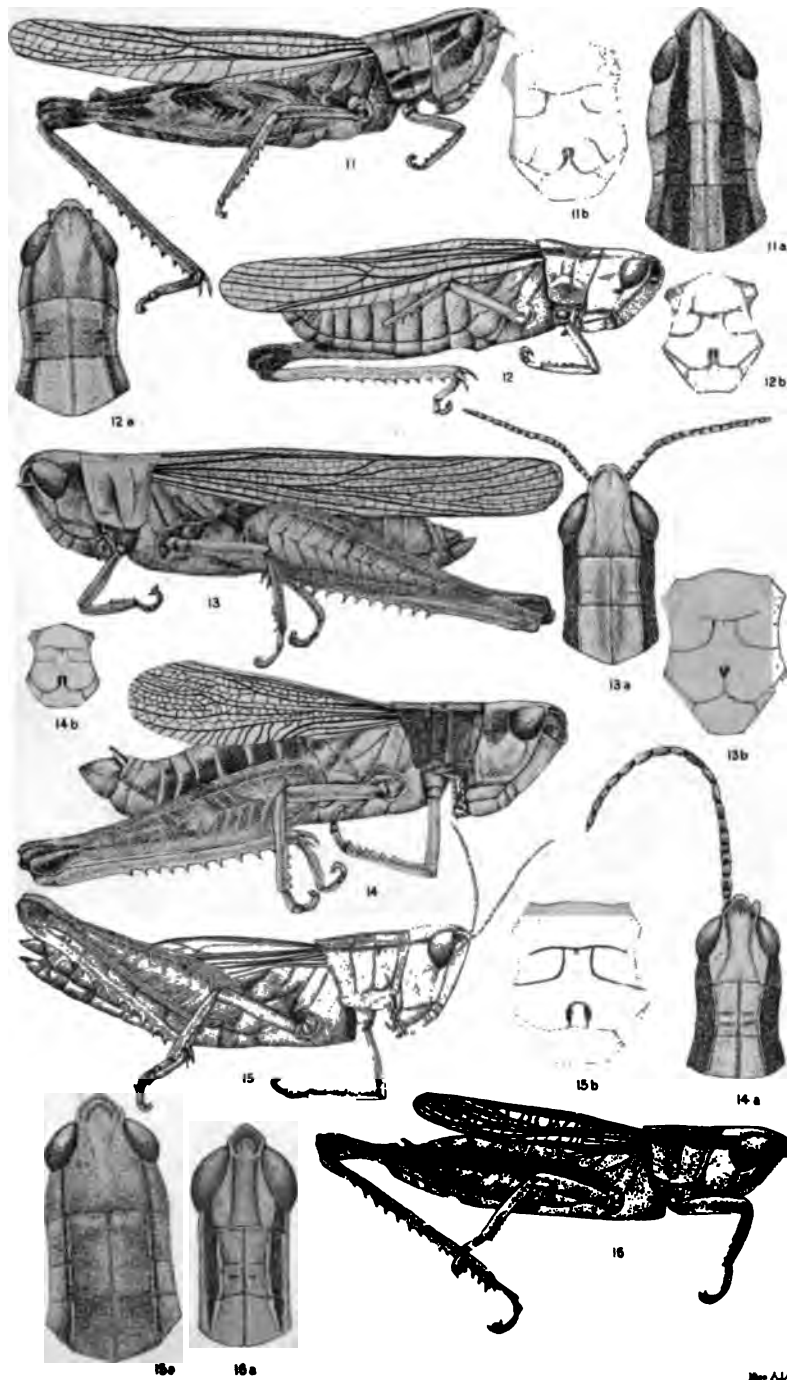




### PLATE III.

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11. *Amphitornus bicolor*, Thos., n. gen. Male ; a — upper view of head and pronotum ; b — sternum.
12. *Akentetes unicolor*, n. sp. and gen. Male ; a — upper view of head and pronotum ; b — sternum.
13. *Amblytropidia occidentalis*, Sauss. Male ; a — upper view of head and pronotum ; b — sternum.
14. *Chloëaltis conspersa*, Harr. Male ; a — upper view of head and pronotum ; b — sternum.
15. *Dichromorpha brunnea*, Scud. Female ; a — upper view of head and pronotum ; b — sternum.
16. *Chlinocephalus elegans*, Morse. Male ; a — upper view of head and pronotum.



Miss A. Semmels, com. var. et. del.

Miss A. Semmels, del.



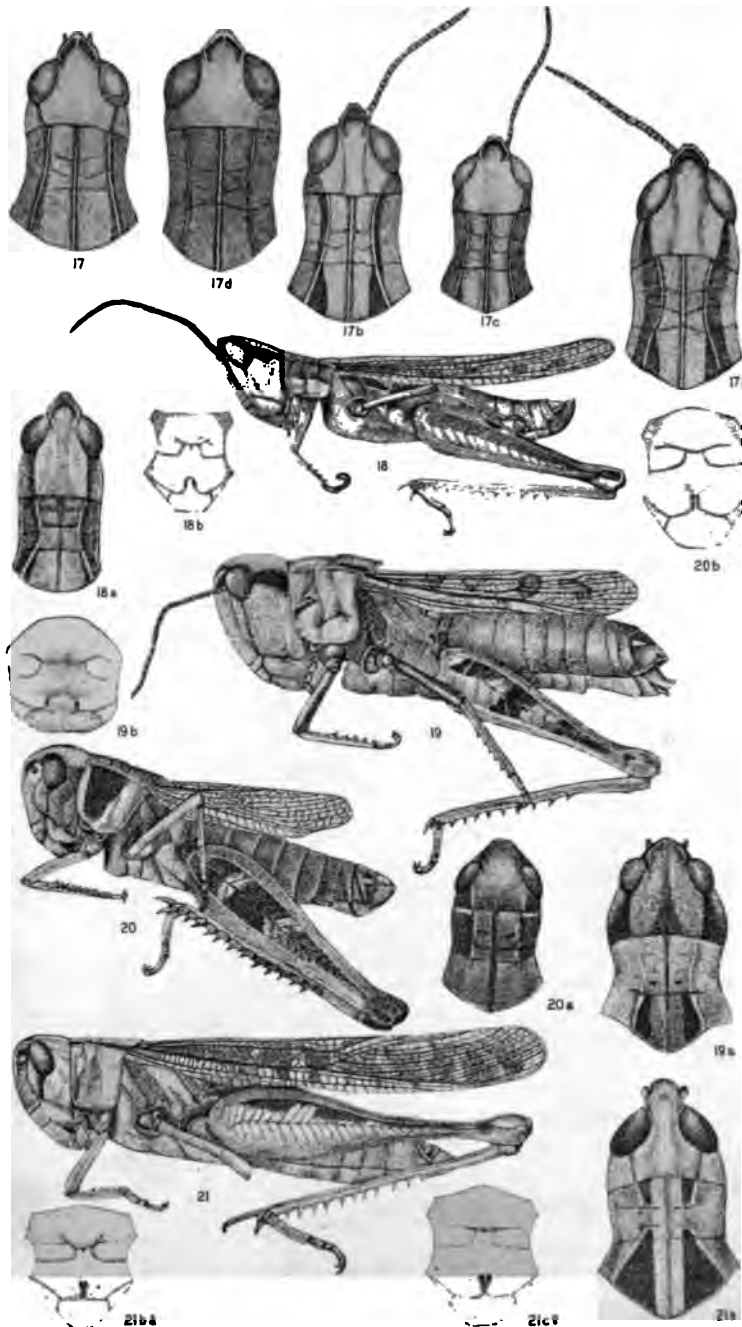
3



## PLATE IV.

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17. *Orphula orizaba*, n. sp. Female — upper view of head and pronotum ;  
a — *Orphula tepanicas*, Sauss. Female, upper view of head and pronotum ; b — *Orphula olivacea*, Morse. Female, upper view of head and pronotum ; c — *Orphula speciosas*, Scud. Female, upper view of head and pronotum ; d — *Orphula decora*, n. sp., upper view of head and pronotum.
18. *Alpha occipitalis*, Thos. Male ; a — upper view of head and pronotum ;  
b — sternum.
19. *Phlibostroma quadrimaculata*, Thos. Female ; a — upper view of head and pronotum ; b — sternum.
20. *Boöpedon nubilum*, Say. Male ; a — upper view of head and pronotum ;  
b — sternum.
21. *Plectrophorus viatorius*, Sauss., n. gen. Male ; a — upper view of head and pronotum ; b — sternum ; c — sternum, female.



Man. Anim. Nat. Sci. Vol. V.

Man. Anim. Nat. Sci. Vol. V.

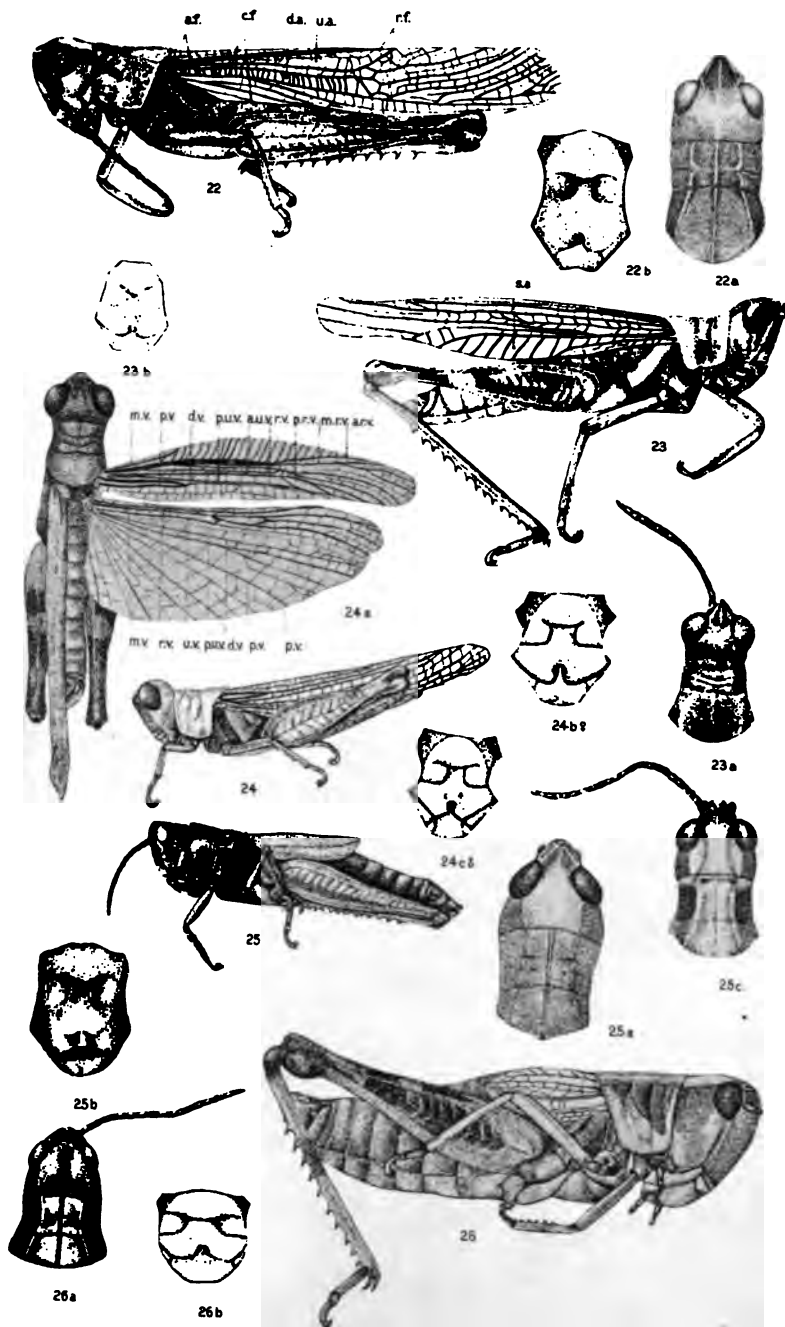




## PLATE V.

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22. *Mecostethus lineatus*, Scud. Male ; a — upper view of head and pronotum ; b — sternum ; a. f., anal field ; r. f., radial field ; c. f., costal field ; d. a., discoidal area ; u. a., ulnar area.
23. *Boötettix argentatus*, Bruner. Male ; a — upper view of head and pronotum ; b — sternum ; s. a., scapular area.
24. *Ligurotettix coquilletti*, n. sp. and gen. Female ; a — upper view of male, showing tegmina and expanded wings ; b — sternum, female ; c — sternum, male ; m. v., mediastine vein ; r. v., radial vein ; a. r. v., m. r. v., p. r. v., anterior, median, and posterior radial vein ; i. v., intercalary vein ; a. u. v., anterior ulnar vein ; p. u. v., posterior ulnar vein ; d. v., dividing vein ; p. v., plicate veins.
25. *Stenobothrus coloradensis*, n. sp. Female ; a — upper view of head and pronotum ; b — sternum ; c — *Stenobothrus sordidus*, n. sp. Male, upper view of head and pronotum.
26. *Brunneria shastana*, Scud., n. gen. Male ; a — upper view of head and pronotum ; b — sternum.



M. A. Mendenhall, as. loc. et. det.

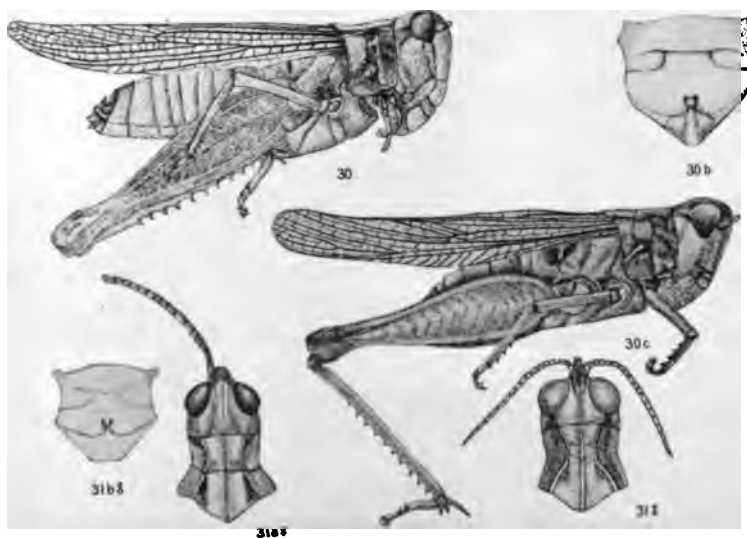
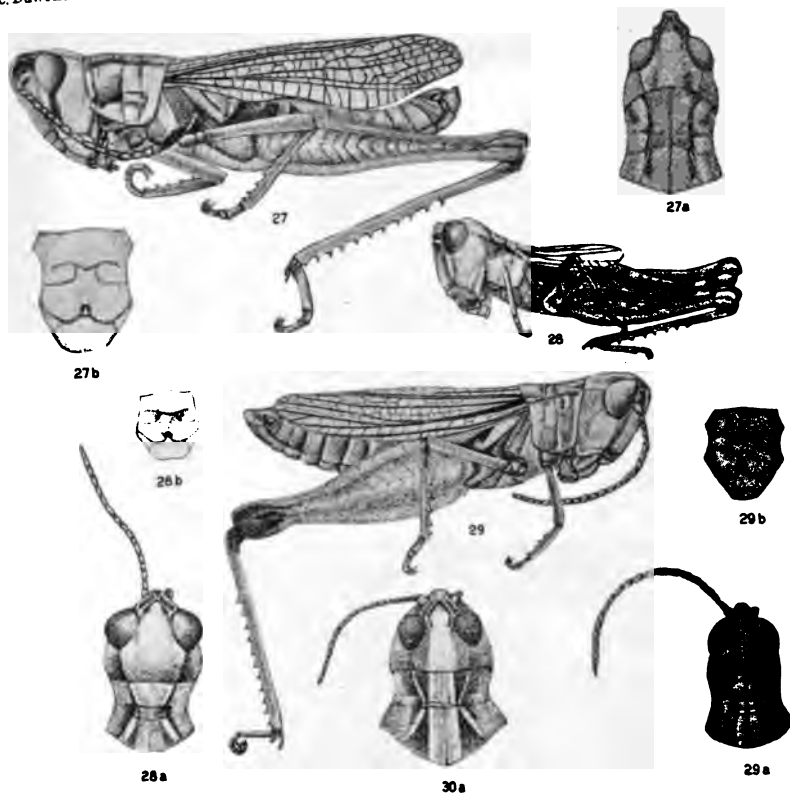
M. A. Mendenhall, det.





## PLATE VI.

27. *Gomphocerus clepsydrus*, Scud. Male ; a — upper view of head and pronotum ; b — sternum.
28. *Psigodes megocephala*, n. sp. and gen. Male ; a — upper view of head and pronotum ; b — sternum.
29. *Eremnus deorum*, Scud., n. gen. Male ; a — upper view of head and pronotum ; b — sternum.
30. *Stirapleura decussata*, Scud. Female ; a — upper view of head and pronotum ; b — sternum ; c — *Stirapleura texana*, Scud. Side view.
31. *Psoloëssa maculipennis*, Scud. Male, upper view of head and pronotum ; a — *Psoloëssa ferruginea*, Scud. Female, upper view of head and pronotum ; b — sternum, male.



Miss A. Stansfield, com. line et del.

Miss A. Leverett, del.



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